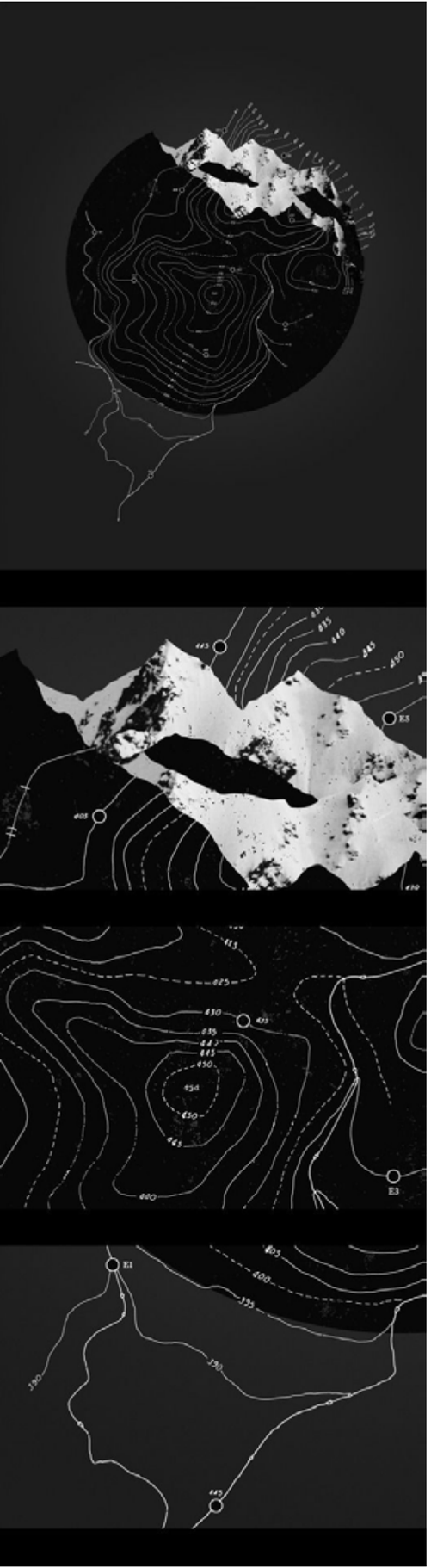


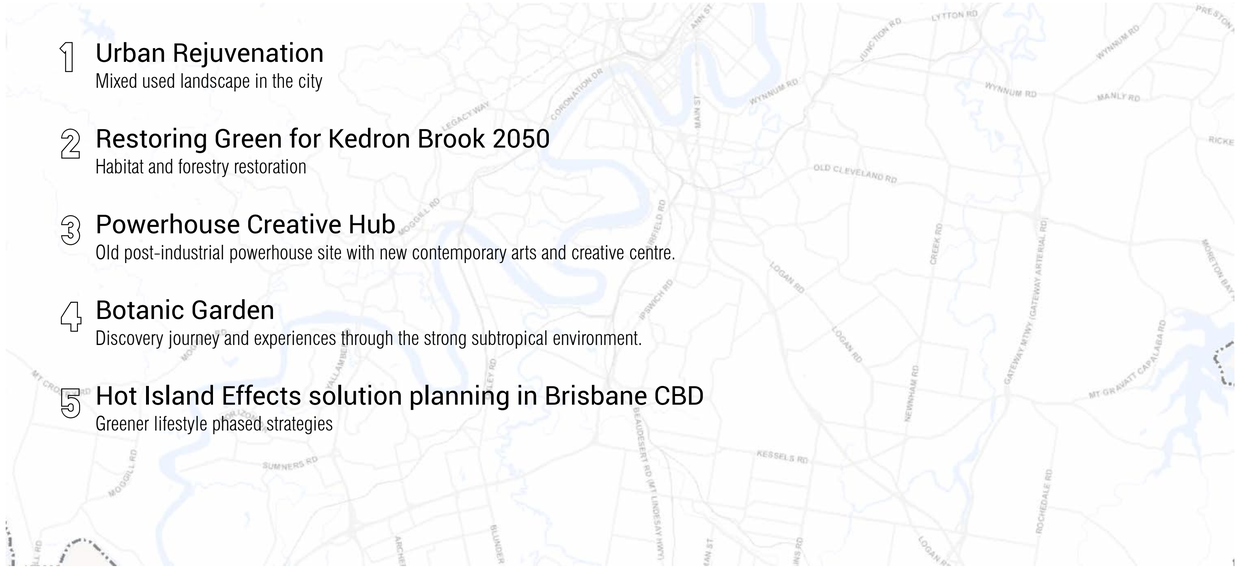
PORTFOLIO

LANDSCAPE ARCHITECTURE

SHUMING RAO

SELECTED WORKS

PROJECTS



1 **Urban Rejuvenation**
Mixed used landscape in the city

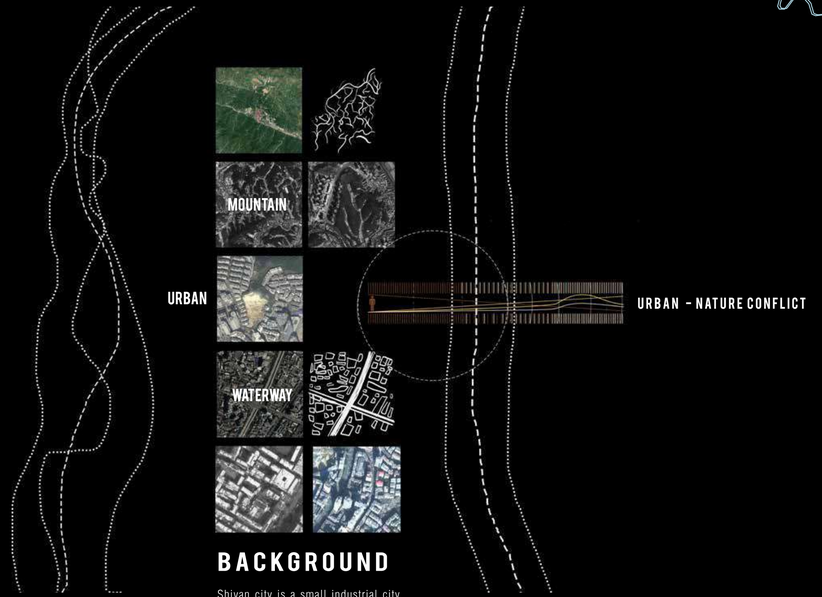
2 **Restoring Green for Kedron Brook 2050**
Habitat and forestry restoration

3 **Powerhouse Creative Hub**
Old post-industrial powerhouse site with new contemporary arts and creative centre.

4 **Botanic Garden**
Discovery journey and experiences through the strong subtropical environment.

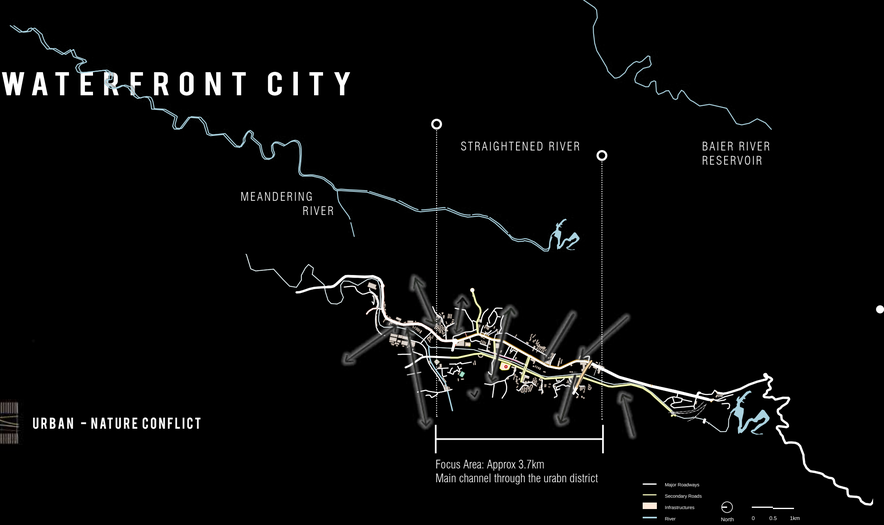
5 **Hot Island Effects solution planning in Brisbane CBD**
Greener lifestyle phased strategies

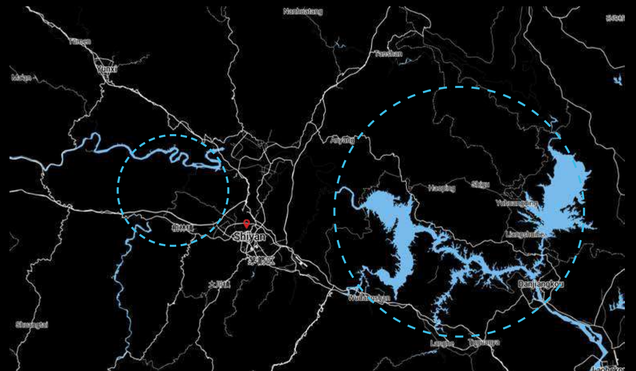
1 REJUVENATION: CROSSING THE WATERFRONT CITY



BACKGROUND

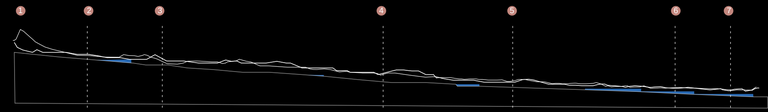
Shiyan city is a small industrial city developed on hilly terrain. Due to its topography and industrial background, to accommodate urbanisation, public open green spaces are precious in urban areas. Baier River as one significant natural corridor in Shiyan was transformed over different periods for meeting different needs and concerns of society.





CONTEXT: STORYLINE OF THE CHANNEL

Baier River is a shallow channel or stream that runs through Shiyan city. As a result of urbanisation, Shiyan city has developed dramatically over a few decades in which the processes transformed the way Baier River look for meeting concerns of society and public needs. The current site reveals conflicts between natural systems and human demands occur as a result of the dramatic changes in land use by urban development. Therefore, the direction of the landscape of Baier River is also facing transformation as the urban development and people's needs of environment shift in time.



TERRAIN & WATERWAY FEATURES FROM THE WATER RESERVOIR TO THE CITY

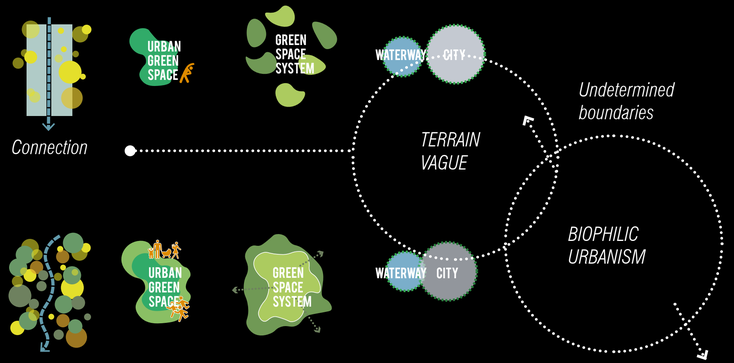
INSPIRATION

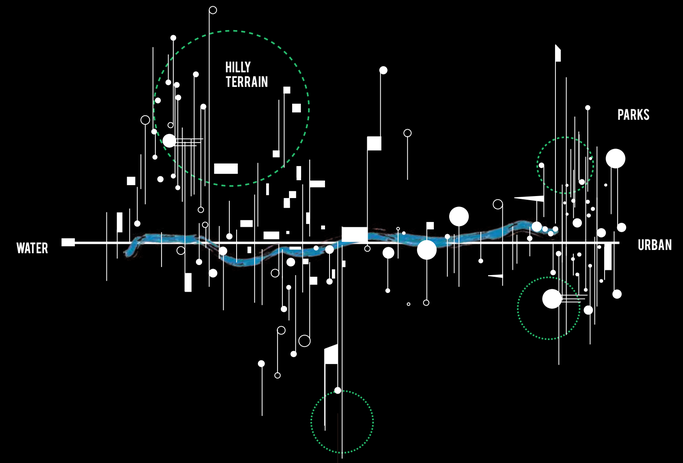
Image: Landezine, Cheonggyecheon Restoration

Image: Studio Dreiseitl, Singapore's Bishan Ang Mo Kio Park

DESIGN METHODS

Built structures and environments sometimes pose constraints and limits to approach nature, these projects especially revolve around the concepts of nature and human in urban public space. These works espicially address pressing social and environmental issues while celebrating the beauty of collective human experience through the use of contemporary materials and technologies.





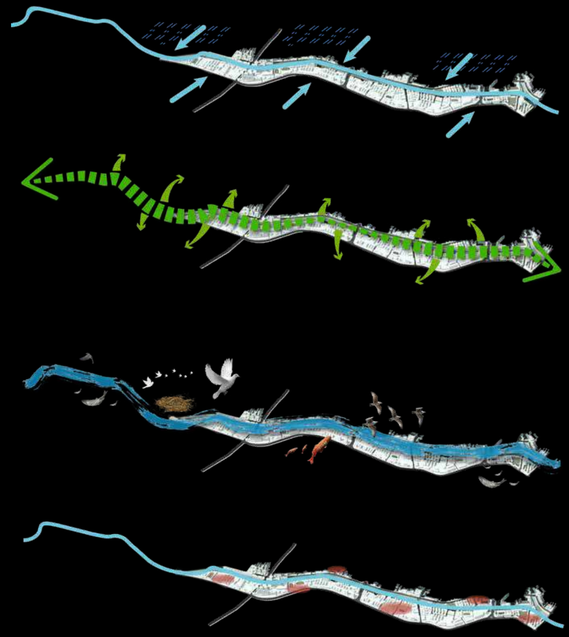
THEORETICAL FRAMEWORK

To manifest the boundaries and limits to freedom of the space, regenerate the landscape spatially embedded into the surrounding areas without setting clear boundaries of the urban space between human and nature.

CONCEPT DEVELOPING

The design is driven by the metaphor of musical rhythms which flow with resting silences and repetitions that form harmony of the space.

This diagram represents the concept of integrating the Baier River and adjacent space with abstract flows through the surrounding urban environment and contexts.



AIMS AND VISION

FLOOD MANAGEMENT

- Reduce flooding risks
- Minimum pollution to the waterway
- Preserve and enhance the flood control features

URBAN CONNECTIONS

- Enhance the cultural, heritage interpretation and the city's identity.
- Foster growth in community awareness and pride in the Baier River as a new destination.
- Support local economic and expanding adjacent commercial opportunities

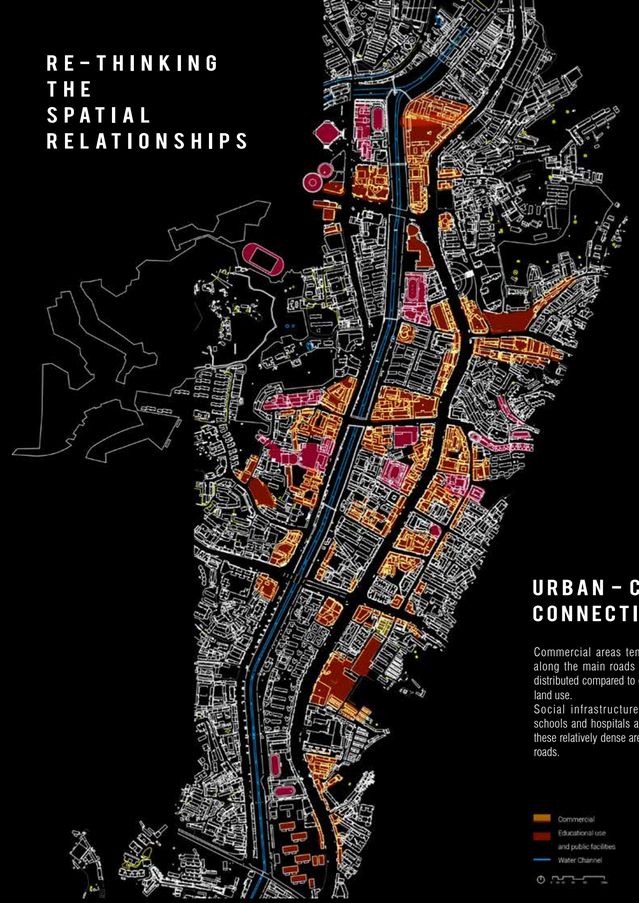
ECOLOGICAL VALUES

- Support wildlife with natural habitats in the urban environment.
- Energise corridor with various flora and fauna species
- Sustain the urban ecology and overall ecosystem health.

LOCAL COMMUNITY

- Recreate new open spaces for people to gather, relax, play and connect with the outdoor environment in the urban area
- Promote a stronger sense of place with water and nature
- Improve pedestrian and green space connectivity along the channel.
- Offer more attractive and accessible for the local community

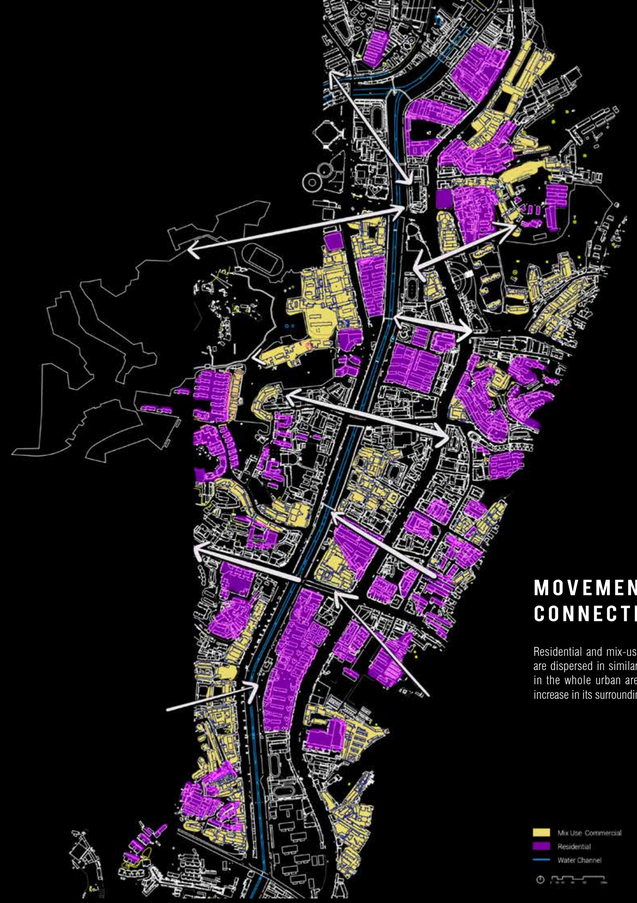
RE-THINKING THE SPATIAL RELATIONSHIPS



URBAN – COMMUNITY CONNECTIVITY

Commercial areas tend to spread along the main roads and densely distributed compared to other types of land use.
Social infrastructures including schools and hospitals are situated in these relatively dense areas near main roads.

Commercial
Educational use and public facilities
Water Channel



MOVEMENT CONNECTIVITY

Residential and mix-use commercial patches are dispersed in similar parts and widespread in the whole urban areas which continue to increase in its surroundings.

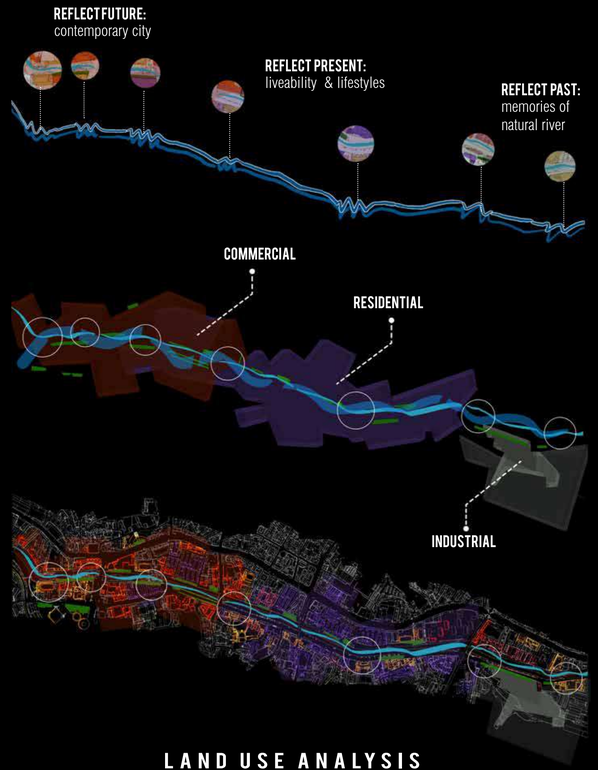
Mix Use Commercial
Residential
Water Channel

GREEN SPACE CONNECTIVITY

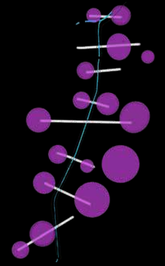
Major designated green space offer opportunities for people to play are situated in the North of the study area as city parks and squares, the rest of the green space are hilly and not quite accessible for the public use.

Green Space
Water Channel

Bringing linkages through the channel side spaces to the surrounding parks and squares



LAND USE ANALYSIS

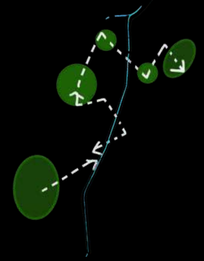


RESOLVE

Sustain the connectivity of spatial movements for supporting community activities from the surrounding residential zones, schools, hospital, etc. Adding socio-cultural and educational values along the channel.

REGENERATE

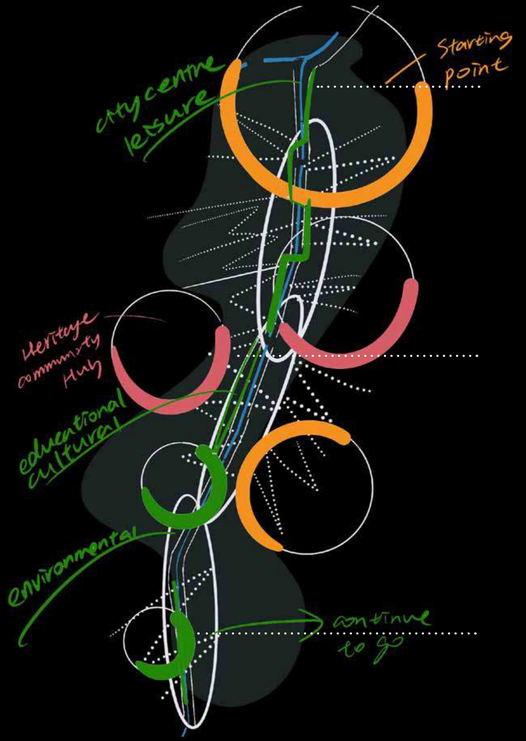
More potentials for increasing the movements and surrounding commercial and retail values on both side of the banks with multi-purposes.



RECONNECT

Conceptualising urban-ecological connectivity for accessible public green spaces and non-accessible hilly forest areas. Create linkages in the natural corridor that showing natural river flows and green corridor.

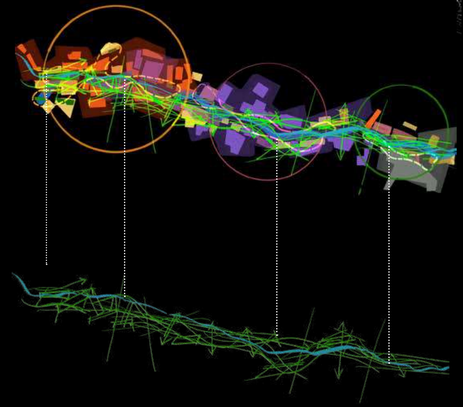
CONCEPTUAL CONNECTION & MOVEMENTS



Develop city's leisure areas that reconnect with adjacent city's shopping precints, city's library, squares, etc.

Educational, cultural for communities near relatively dense residential areas, and social infrastructures such as schools and hospitals

Environmental focus as adjacent industrial land and vegetated hill with vulnerable areas as ecological restoration

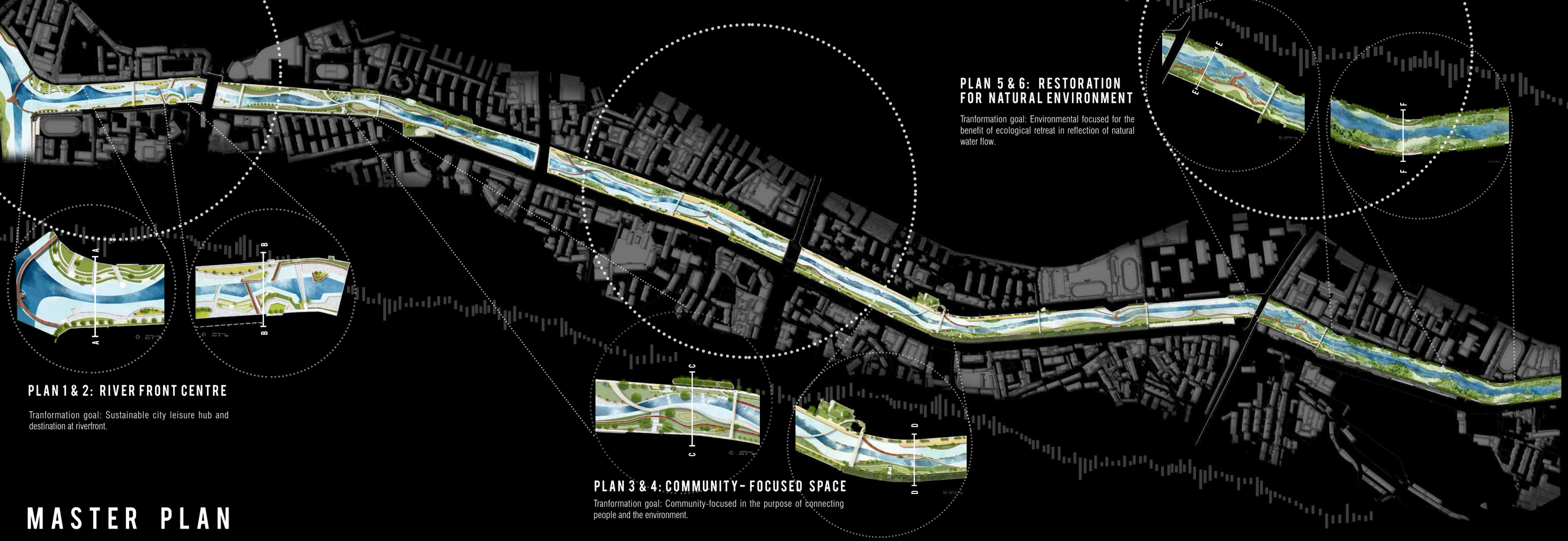


DESIGN CONCEPT

The design is driven by the metaphor of musical rhythms which flow with resting silences and repetitions that form harmony of the space. Integrating the Baier River and adjacent space with new abstract flows through the surrounding urban environment and contexts.

The concept illustrates the linear space with multiple functions and elements as well as energise the surrounding green space for better connectivity inside and along the river channel.

While each zone is having a major focus of transformation, they all have consistent and mutual features but distinctive design as one integrated channel.



PLAN 1 & 2: RIVER FRONT CENTRE

Tranformation goal: Sustainable city leisure hub and destination at riverfront.

PLAN 3 & 4: COMMUNITY- FOCUSED SPACE

Tranformation goal: Community-focused in the purpose of connecting people and the environment.

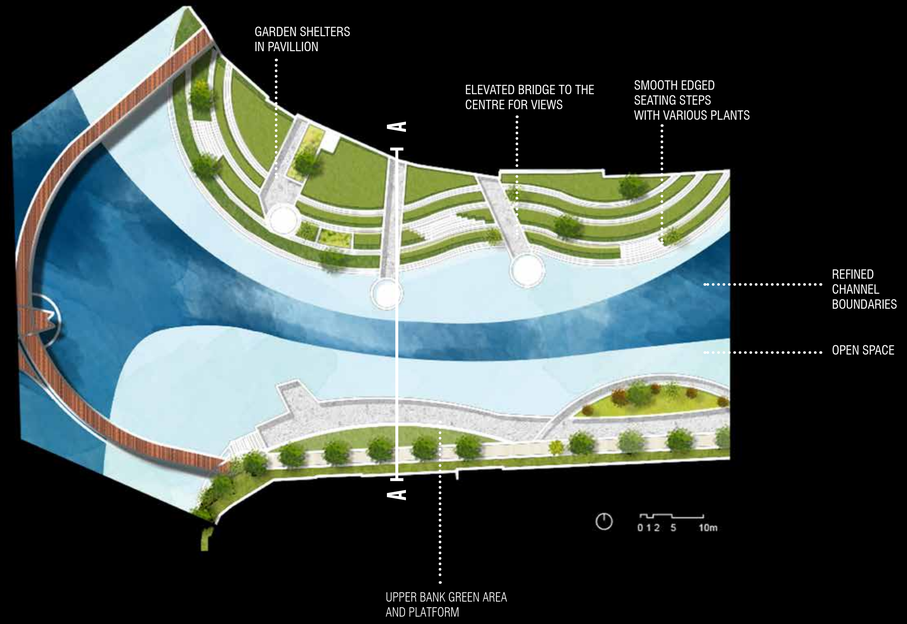
PLAN 5 & 6: RESTORATION FOR NATURAL ENVIRONMENT

Tranformation goal: Environmental focused for the benefit of ecological retreat in reflection of natural water flow.

MASTER PLAN

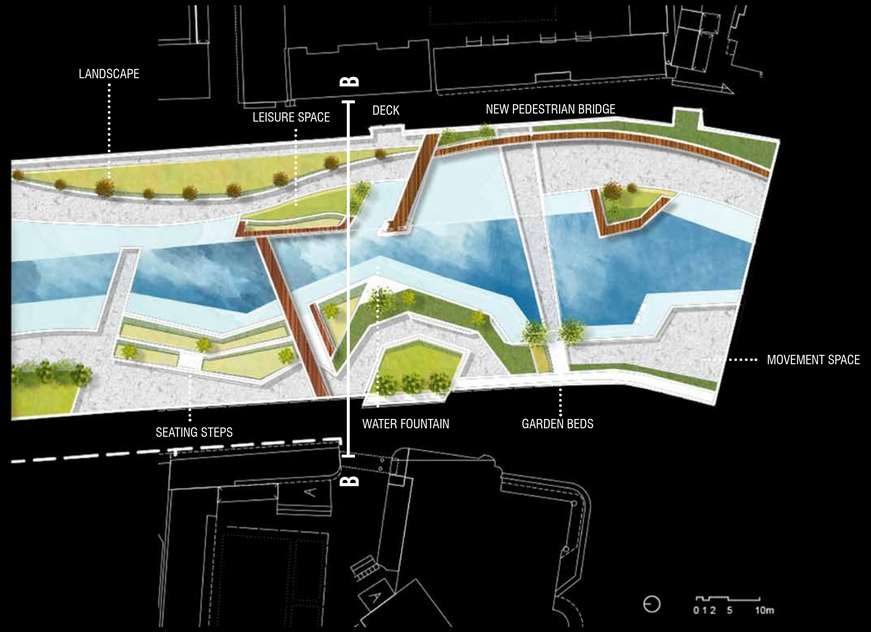
N

0 20 40 80 120 200m



PLAN 1: RIVER FRONT CENTRE

Re-establish a sense of welcoming, aesthetic and visual impact in the centre to represent the city's development through the reflection of the channel in between people and open space.

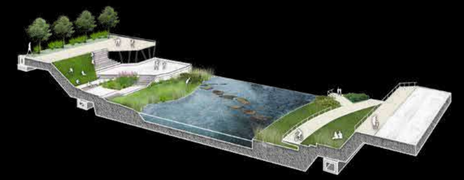


PLAN 2: RIVER FRONT CENTRE

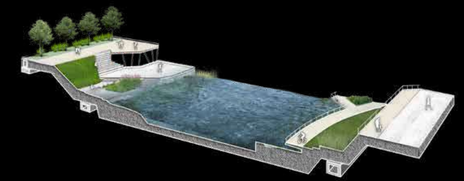
Offering well-interconnected pathways within the riverfront to encourage pedestrian movement and various range of uses

INDICATIVE DESIGN

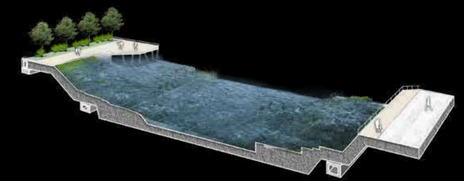
Corresponding to the stormwater management and landscape system from normal to flood conditions in the future.



NORMAL CONDITION



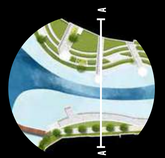
FLOOD CONDITION



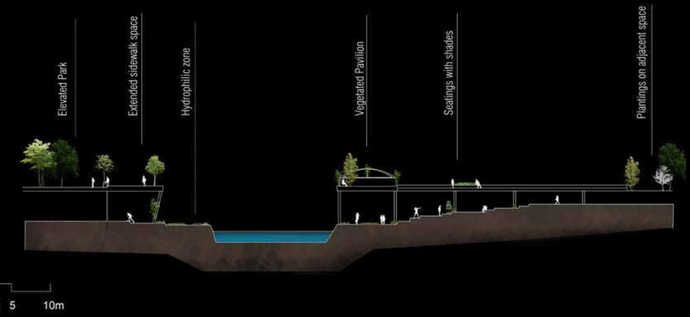
50-YEAR FLOOD CONDITION

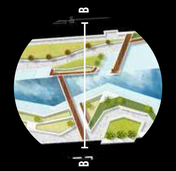
RIVER FRONT URBAN CENTRE

The design will enhance the spatial quality and experiences by using urban stormwater management approach, in selected focus zones, utilising ecological detention lawn and sponge system to support vegetation irrigation and small landscape water features adjacent to the river.

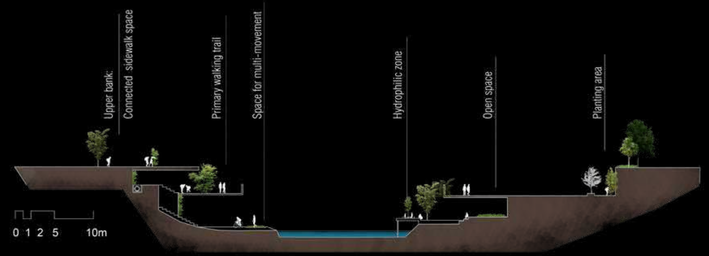


RIVER FRONT CENTRE
Elevational section AA

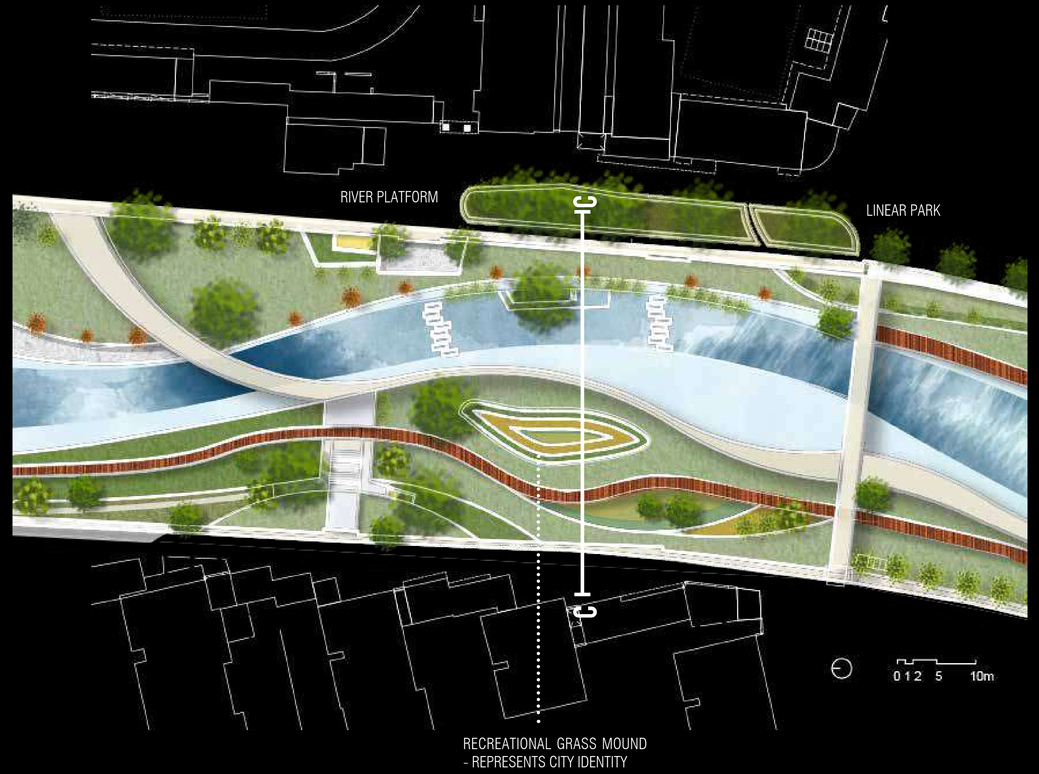


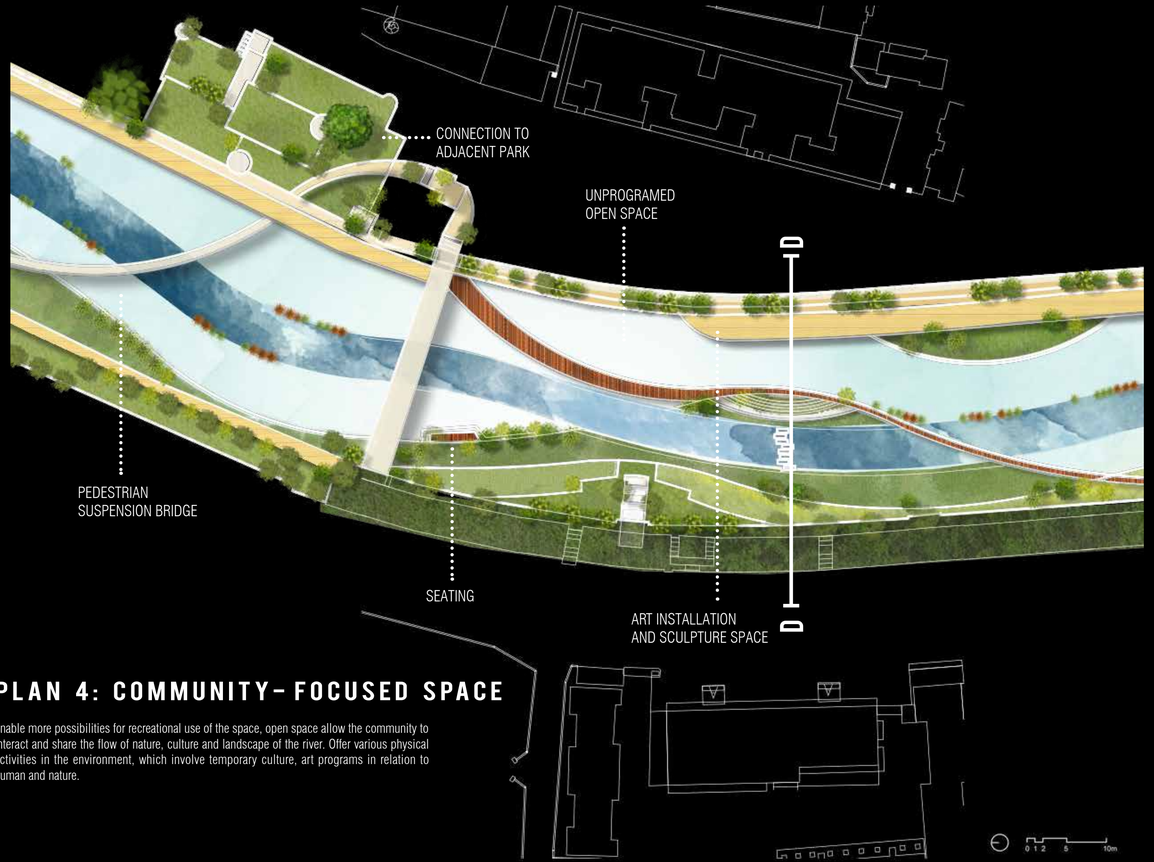


RIVER FRONT CENTRE
Elevational section BB



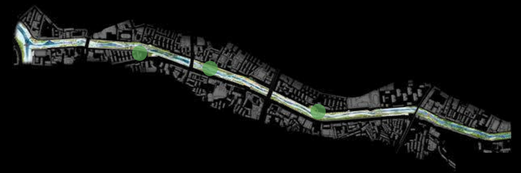
PLAN 3: COMMUNITY- FOCUSED SPACE





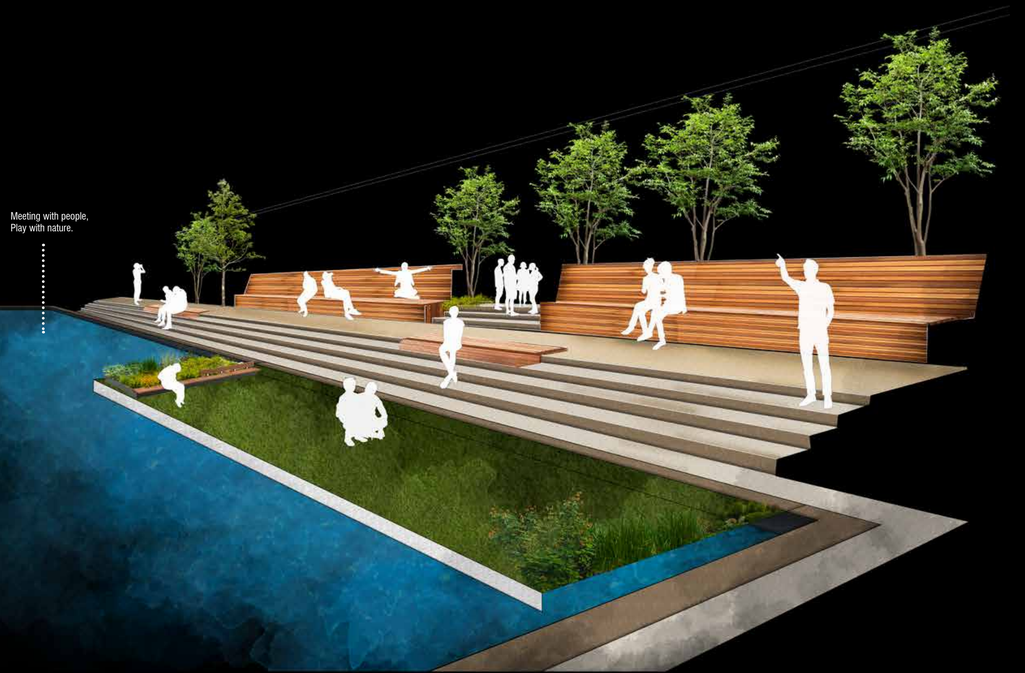
PLAN 4: COMMUNITY- FOCUSED SPACE

Enable more possibilities for recreational use of the space, open space allow the community to interact and share the flow of nature, culture and landscape of the river. Offer various physical activities in the environment, which involve temporary culture, art programs in relation to human and nature.



COMMUNITY- FOCUSED SPACE

Open green space that are optimal for relaxation within the recreational zones, these areas are expected to be meeting and play with nature.



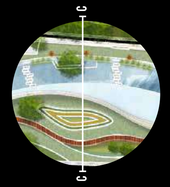
PLAN 5:
RESTORATION FOR NATURAL ENVIRONMENT

In the purpose of developing biodiversity and making urban habitat, restore natural environment and waterway and various species in the environment-focused area to reflect the past memories prior to urbanisation and development.

PLAN 6:
RESTORATION FOR NATURAL ENVIRONMENT

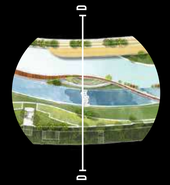
Some zones in this ecological section will become vegetated hills where it functions as a border and buffer so the community cannot enter to a certain zone where the presence of human beings will not disturb the fauna.

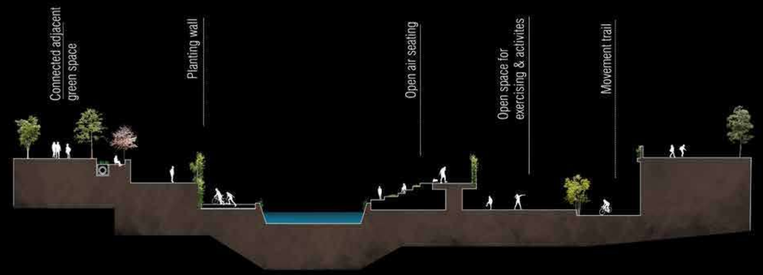
COMMUNITY CENTRE
Elevational section CC



ELEVATIONAL SECTION CC: RECREATIONAL SPACE

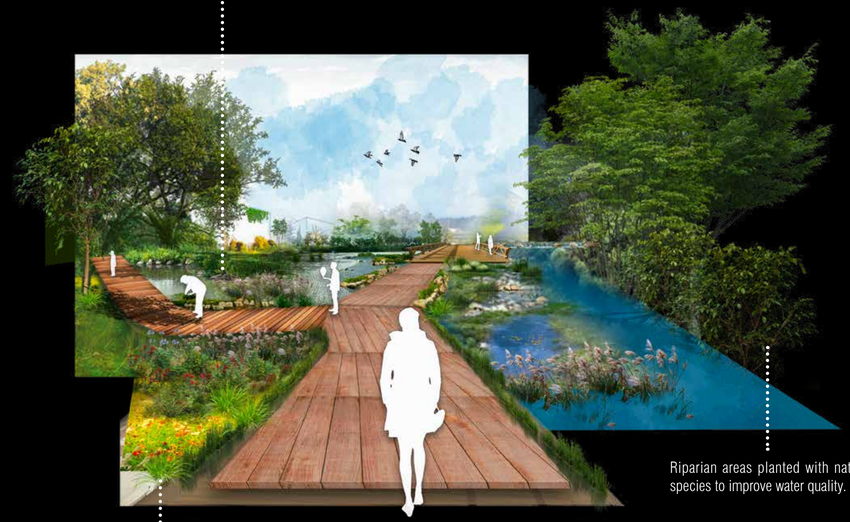
COMMUNITY CENTRE
Elevational section DD





ELEVATIONAL SECTION DD: COMMUNITY MOVEMENTS

Recreate small bio-swales for ecosystems and wetland, where native flora and fauna can take place and help with the balance of the channel.



Riparian areas planted with native species to improve water quality.

Diverse vegetative layers

PLANTING SELECTIONS: TREES

EVERGREEN

DECIDUOUS

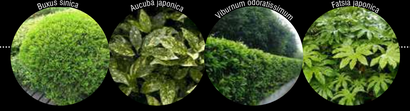
A wide range of trees species with seasonal displays along pedestrian sidewalks and major areas for providing shades and sense of arrival to invite people to enter the channel's new space.

Selected trees will support the development of buffer in the ecological zone visually and physically.

SHRUBS AND GROUND COVERS

FLORAL

GREENERY



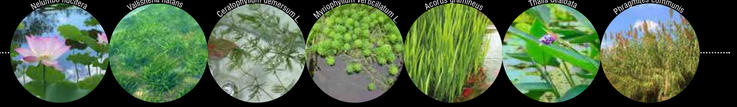
Cultivate various small to medium sized shrub species in each zones to regenerate ecosystem with multi-layers and different spatial experiences for users.

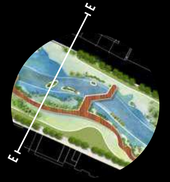
GRASS AND AQUATIC PLANT

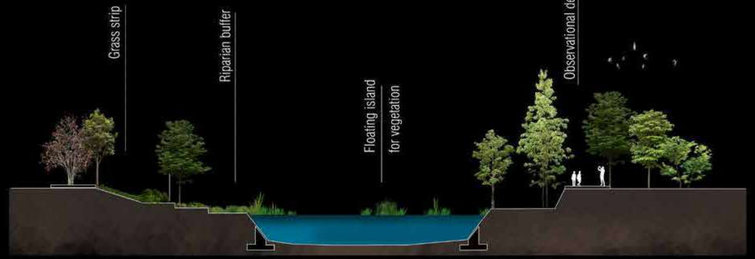
GRASS

Assure the ecological restoration, improve ecological health for the channel, and provide possible crossing for wildlife.
Concrete planting troughs will be installed at the bottom of the section to prevent scouring and erosion by flooding risks.

SUBMERGED / AQUATIC PLANTS

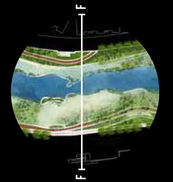


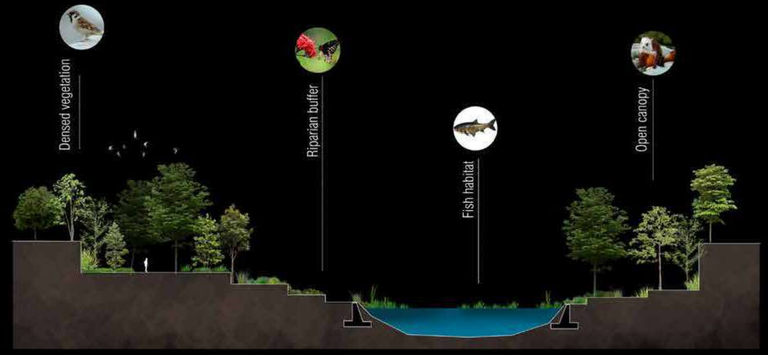




0 1 2 5 10m

ELEVATIONAL SECTION EE: SMALL ECOSYSTEM





0 1 2 5 10m

ELEVATIONAL SECTION FF: ECOLOGICAL RESTORATION

2 RESTORING GREEN
FOR KEDRON VALLEY 2050

scale 1:50000

0 2 4 6 8 km

SITE CONTEXT

As an important tributary, Kedron brook spans a large area in the northern Brisbane. Kedron brook was one of the Brisbane's earliest found region with rich resources for European missionaries and settlers. Different areas along the catchment have different ecosystems, flora and fauna.

Topography

The topography of site suggests western and southern areas with steep slopes and higher vegetated density across the areas. In comparison, the eastern parts of the site are with gentle and flat slopes in general. The existing topographic features in the eastern part giving more space and chance for development.

GEOMORPHOLOGY

Slope Analysis

Surface

Geology

Ariel terrain

ECOSYSTEMS ALONG KEDRON BROOK

Melaleuca open woodlands on depositional plains

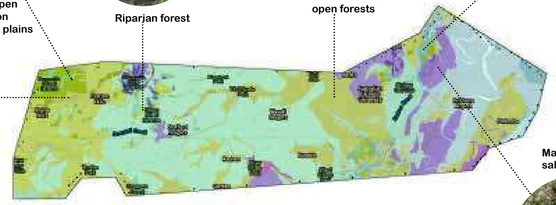
Riparian forest

Eucalypt woodlands to open forests

Paperbark forests

Of Concern
Dominant

Endangered dominant vegetations

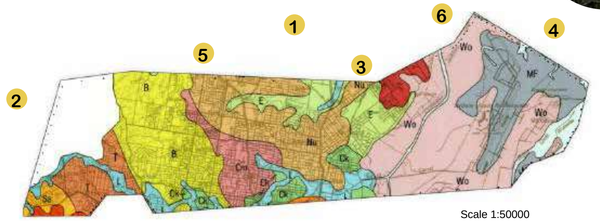


Grassland

Mangroves and saltmarshes

VEGETATION SIGNIFICANCE

Streamside vegetation and floodplains habitats vary in form and composition along the length of Kedron Brook, which therefore offer various types of habitat and effectiveness of linkages for a range of fauna.



Scale 1:50000

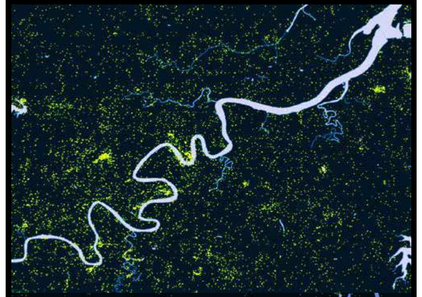
0 2 4 6 8 km

SOIL TYPES

1 Chermside: Lithosols with shallow podzolic soils
2 Enoggera: Shallow stony lithosols and gritty yellow podzolic soils
3 Clayfield: Red earths with some mottled yellow podzolic soils
4 Nundah: Red-yellow podzolic soils with red earths
5 Samford: Soloths and yellow podzolic soils
6 Woongoolba: Humic gleys, peaty gleys and solonchaks

ATLAS OF LIVING FAUNA

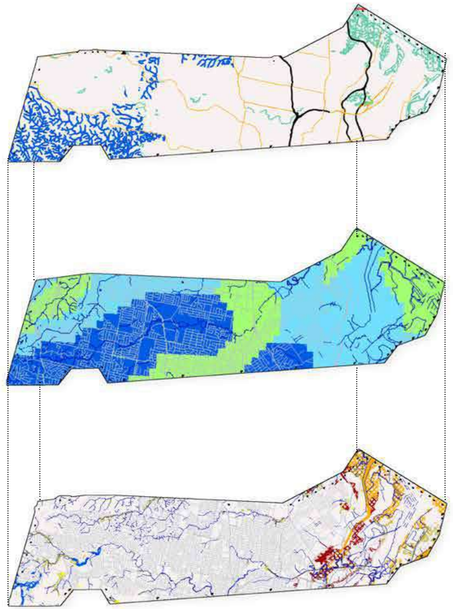
With the increasing urbanization, road construction and changes in land uses have been challenging the natural habitats of animals and plants.



SITE ANALYSIS

HYDROLOGY

As the survey suggests that there are significant ecological values where the channels and creeks run through, areas with medium to high aquatic conservation is another aspect that needs to be preserved for future development.



Wetland and waterways

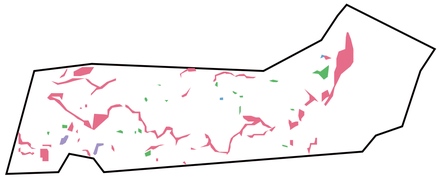
- Declared high ecological value waters
- High ecological significance wetlands

Aquatic conservation

- Very high
- Hign
- Medium

Catchment

- Riverine Waterbodies
- Palustrine Waterbodies
- Estuarine Waterbodies
- 1-50% wetland



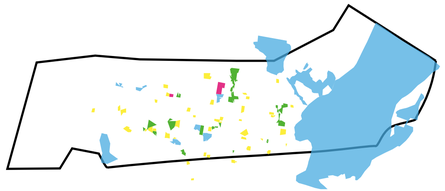
OPEN SPACE

Open spaces are usually isolated as small fragmenting patches in separate locations, which are being used for a particular function, such as parks, sports fields, golf courses and recreations for other leisure activities.
In a bigger picture, open space patches are more commonly located along the water corridors through the site.

- Parkland and leisure activities
- Felds, campuses
- Cemetery
- Extraction: mining, quarry

Scale 1:50000

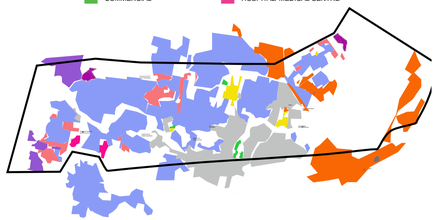
0 2 4 6 8 km



- INDUSTRIAL
- COMMERCIAL
- EDUCATION
- HOSPITAL/ MEDICAL CENTRE

LAND USE

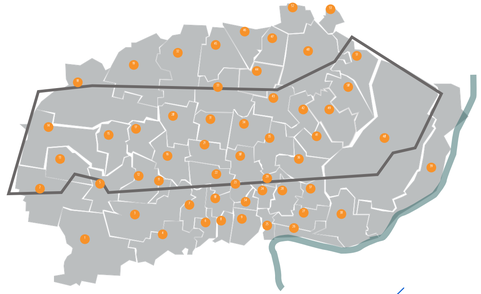
While residential taking place a majority of land, industrial uses are largely happening on the east where the topographic features are generally flat compared to the rest of the area. Education and commercial uses of lands connecting suburbs. A mixed-use of several areas indicate the needs of the community.

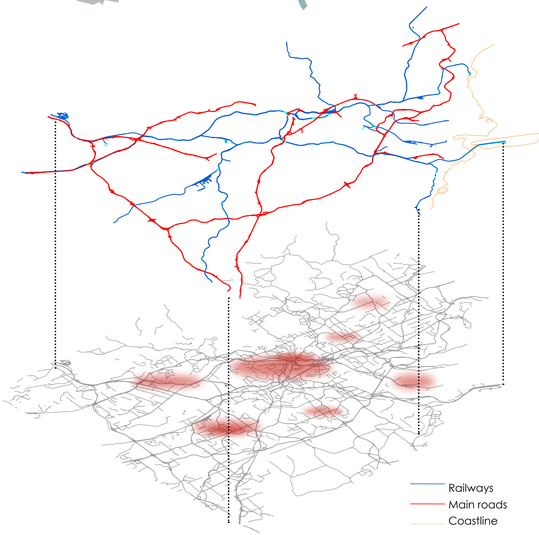


- QUARRIES
- WASTE & RECYCLING
- MANUFACTURING & MINED SERVICE
- RURAL
- LOW DENSITY single house to 2 storey
- MEDIUM DENSITY multiple 3-5 storey
- HIGH RISE 6+ storey
- MIXED USE
- EMERGING COMMUNITY land zoned for RCC for potential future residential use

Scale 1:50000

0 2 4 6 8 km





- Railways
- Main roads
- Coastline

Connectivity and flow network

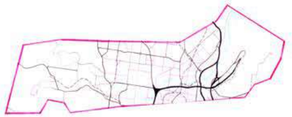
DEMOGRAPHIC & GREEN SPACE

There are 54 suburbs in the area, each with thousands of population and green spaces ranging from numbers.

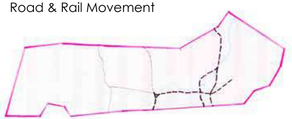
- Suburbs
- Residential
- brisbane river

Scale 1:50000

0 2 4 6 8 km



Road & Rail Movement



Critical Routes & Interim Critical Routes

Primary Freight Routes

MOVEMENT

Major roadways and movements occur from all directions toward to the centre.
As roads expanding across the city it will bring in high volumes of traffic, continuing growth in volumes has given rise to a range of increasingly complex challenges for the urban environment.
In future development, movement network will be expected to deliver multi-functioned transport which capable of moving through more efficiently.

WILDLIFES AND THEIR LIVING CONDITIONS

FOREST BIRDS:
Currently less common to be found due to lack of habitat, but still relatively common in thick vegetation remnants along Kedron Brook.

FISH:
Fish most likely to survive in Kedron Brook are those able to utilise a number of habitas, adpat to change and tolerate the fluctuating pollution and nutrient levels.

AQUATIC INVERTEBRATES
Freshwater crustaceans (shrimps and prawns), the highest diversity are commonly expected to be found in the upper catchment where there is less pollution. Coastal crustaceans are losing their habitat due to clearing and are very sensitive to disturbance and pollution.

BUTTERFLIES
In urban gardens pesticides applied to fruit trees and garden plants will harm butterflies or their larva. Butterflies are able to utilise both the Kedron Brook environs and nearby urban gardens.

AMPHIBIANS
It was noted that there has been a decline in frog populations around the world. Habitat loss is one main reason caused decline.
Tree frogs, marsh or sedge frogs, and burrowing frogs all occur in the vicinity of Kedron Brook

A Future About Re Green

Wildlife rehabilitation

Urban forest restoration

Obeservation point

Restoring
Envisaging
Rehabilitating

Green

LACK OF CONNCETIONS

Users reach to the park as a destination mainly for outdoor recreational uses and purposes, the current status of cultural heritage is lack of connection between its environment, which need to strengthen the identity more by improving the function with social, cultural and educational values.

VEGETATION MANTAINANCE

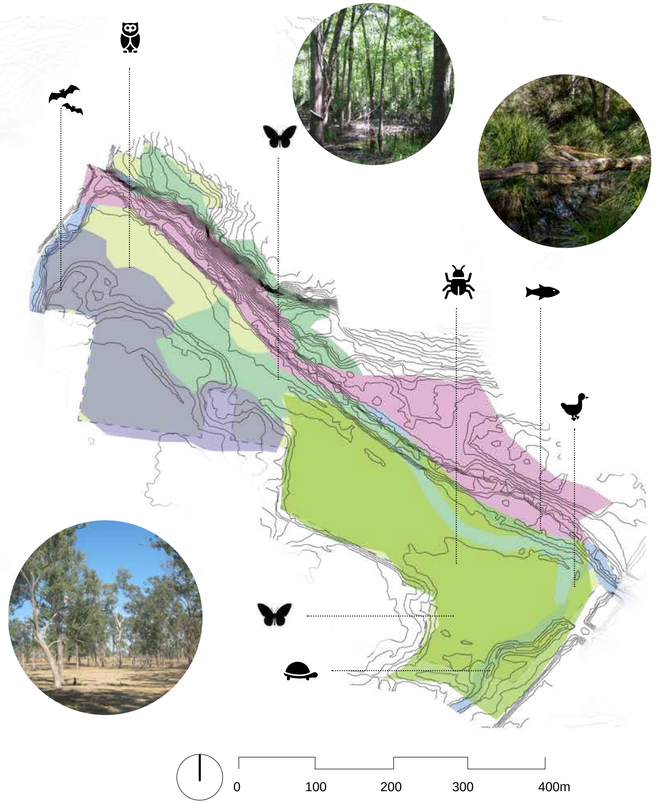
Much of the site has a steep sloping gradient along the creek, which poses a concern in regards to issues of erosion and accessibility for restoration, and the protection of the remnant vegetation groups as well as for fauna habitat.

WATER SOLUTION

Water quality and condition of the catchment threat the living of aquatic invertebrates which they were losing habitat due to clearing and very sensitive to disturbance and pollution.
Water enhancement and flood solutions are needed for site rehabilotation.

GREEN BUFFERS

Traffic noises, emissions and pollutions from the road across the edge of the park. Prevent negative environmental effects of urbanization. Urban populations interact with environment which threating open spaces as for future potential development.



Current Kalinga park rattings	
Conservation Value Rating	*5/10*
Aquatic Habitat rating	*4/10*
Riparian Habitat rating	*6/10*
Wildlife Corridor Rating	*4/10*
Aquatic representativeness rating	*4/10*
Riparian representativeness rating	*4/10*

The site has moderate habitat value that worth of enviaging an eco-friendly vibrant urban forest toward the future for enhancing and restoring flora and fauna as well as benefit the local communities.

Revegetate the steep slope alongside the Kedron Brook catchment to enhance natural wildlife corridor as well as further provide bank stabilisation and erosion control.

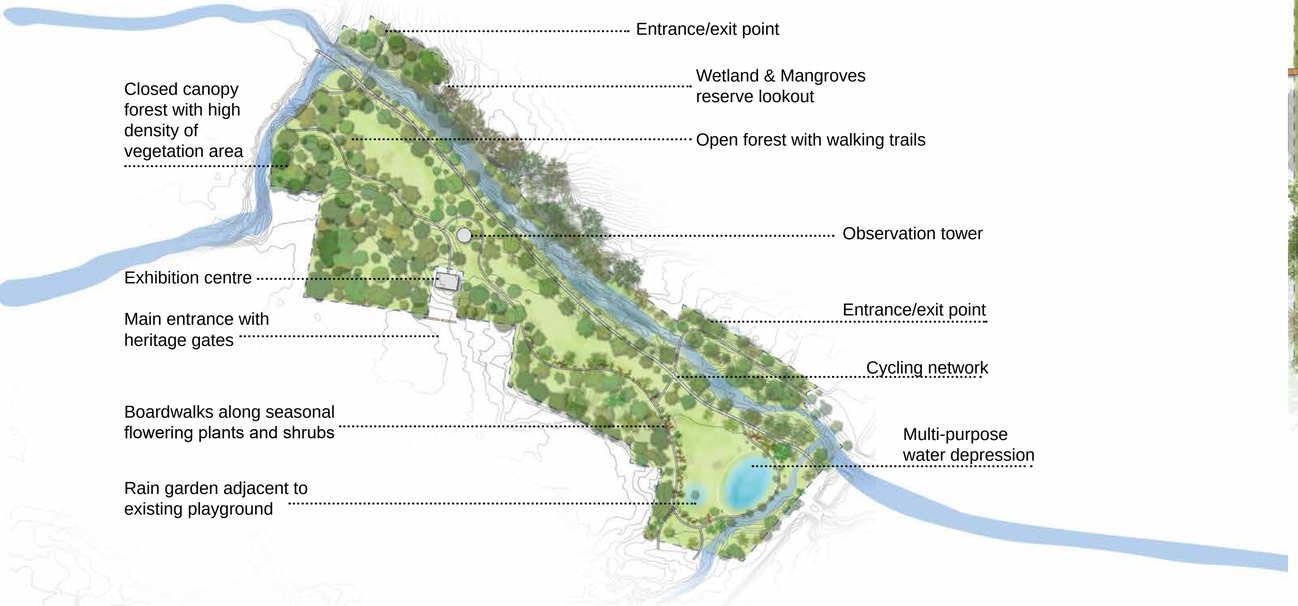
For instance, there are some large trees with hollows near Sandgate Road which are likely to be important habitat trees for arboreal mammals, microbats and hollow nesting birds.

Currently, parts of this area are not frequented used by people, and as such provide habitat for small granivorous birds that favour the protection offered by grasses and understorey plants.

local Boy Scout troop at the ceremony 1920

HISTORY & HERITAGE

A set of memorial gates which dedicated in October 1920 at the entrance to the park in remembrance of local men who gave their lives in the war, for a time the area became known as Anzac Memorial Park. These historical site characters demonstrates rare, uncommon or endangered aspects of Queensland's cultural heritage.


Entrance/exit point
Wetland & Mangroves reserve lookout
Closed canopy forest with high density of vegetation area
Open forest with walking trails
Observation tower
Exhibition centre
Entrance/exit point
Main entrance with heritage gates
Cycling network
Boardwalks along seasonal flowering plants and shrubs
Multi-purpose water depression
Rain garden adjacent to existing playground

MASTER PLAN

Scale 1:2000

0 100 200 300 400m

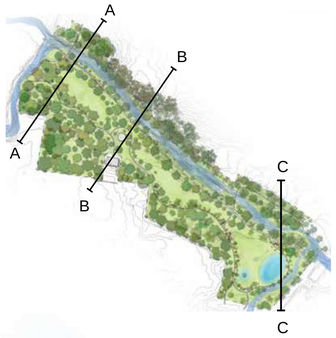
DETAIL PLAN

Scale 1:500

0 20 40 60 80m

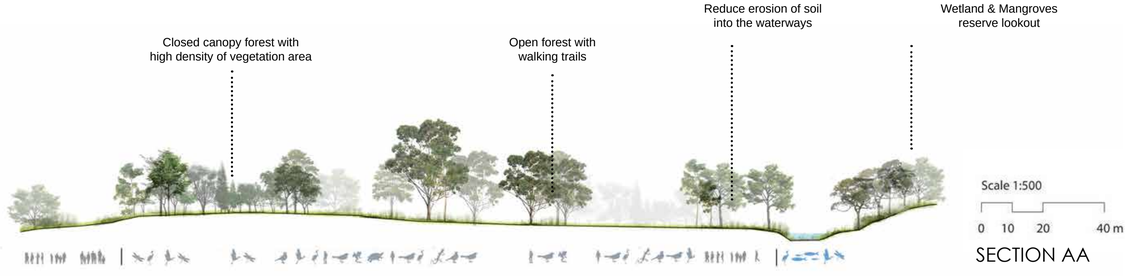
RESTORABLE LANDSCAPE

Improving flood resilience and unlock the potential use for human and non-humans, as well as minimise increases to flood heights.

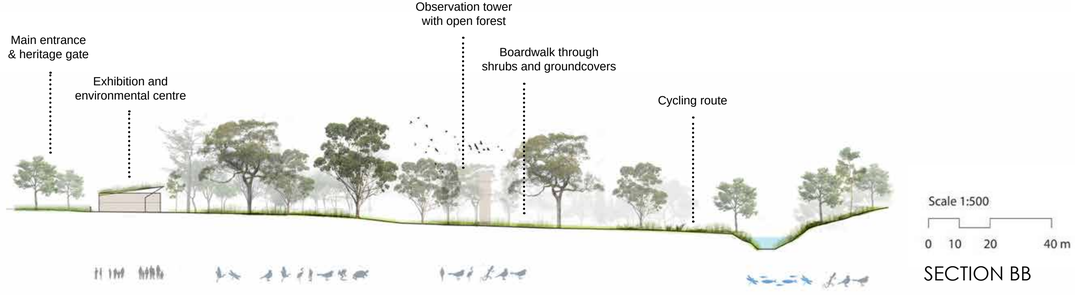


capture storm water in wet seasons, attract birds and aquatic animals

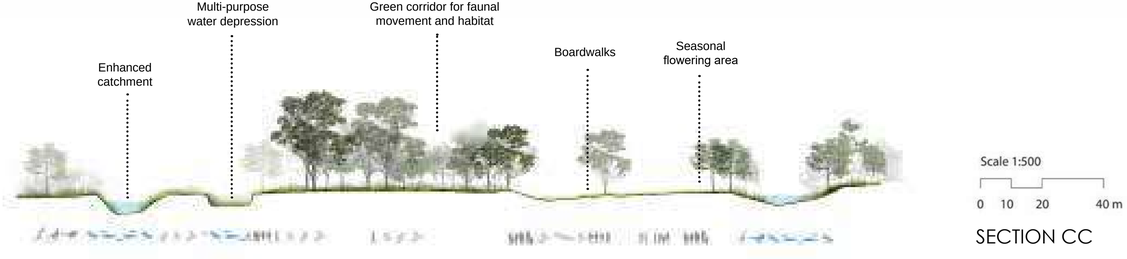
Recreational space for human activities such as picnics, sports and other leisure uses.


Closed canopy forest with high density of vegetation area
Open forest with walking trails
Reduce erosion of soil into the waterways
Wetland & Mangroves reserve lookout
Scale 1:500
0 10 20 40 m

SECTION AA


Main entrance & heritage gate
Exhibition and environmental centre
Observation tower with open forest
Boardwalk through shrubs and groundcovers
Cycling route
Scale 1:500
0 10 20 40 m

SECTION BB



SECTION CC

RESTORING GREEN
FOR KEDRON VALLEY 2050

HABITAT

Building its rich network of diverse vegetation
with the surrounding green spaces.
Planing the corridors for the future and promote
integrated green space for restoring wildlife habitats.

ECOLOGY

Establish a rich sustainable green linkage that connects with the surrounding green spaces. Kalinga Park will become a green corridor for the future to restore the ecological environment along the Kedron Brook and the North of Brisbane,

3 Powerhouse Creative Hub : REGENERATING ENERGY

PROBELEM

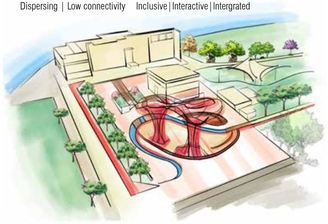
The existig site of the power station is close to river banks and parks, and the surrounding environment has unique advantages and opportunities, but the possibilities and site potential have not been fully utilized.

FUNCTIONAL DIAGRAM

Lack of the sense of arrival and the connections with the surroundings, and more effective paths are needed to enhance site connectivity.

Before: Dispersing | Low connectivity

After: Inclusive | Interactive | Intergrated



HAND-DRAWN FOR THE PROPOSED LANDSCAPE

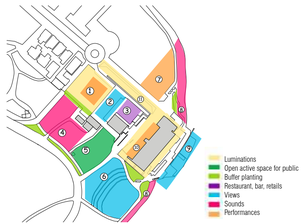
DETAILED VIGNETTE 2

DESIGN VISION

Brisbane Powerhouse will be a place that produces different types of energy to spread sensual pleasures and bliss of beauty in the open interactive space for enhancing the Powerhouse identity and inclusiveness.

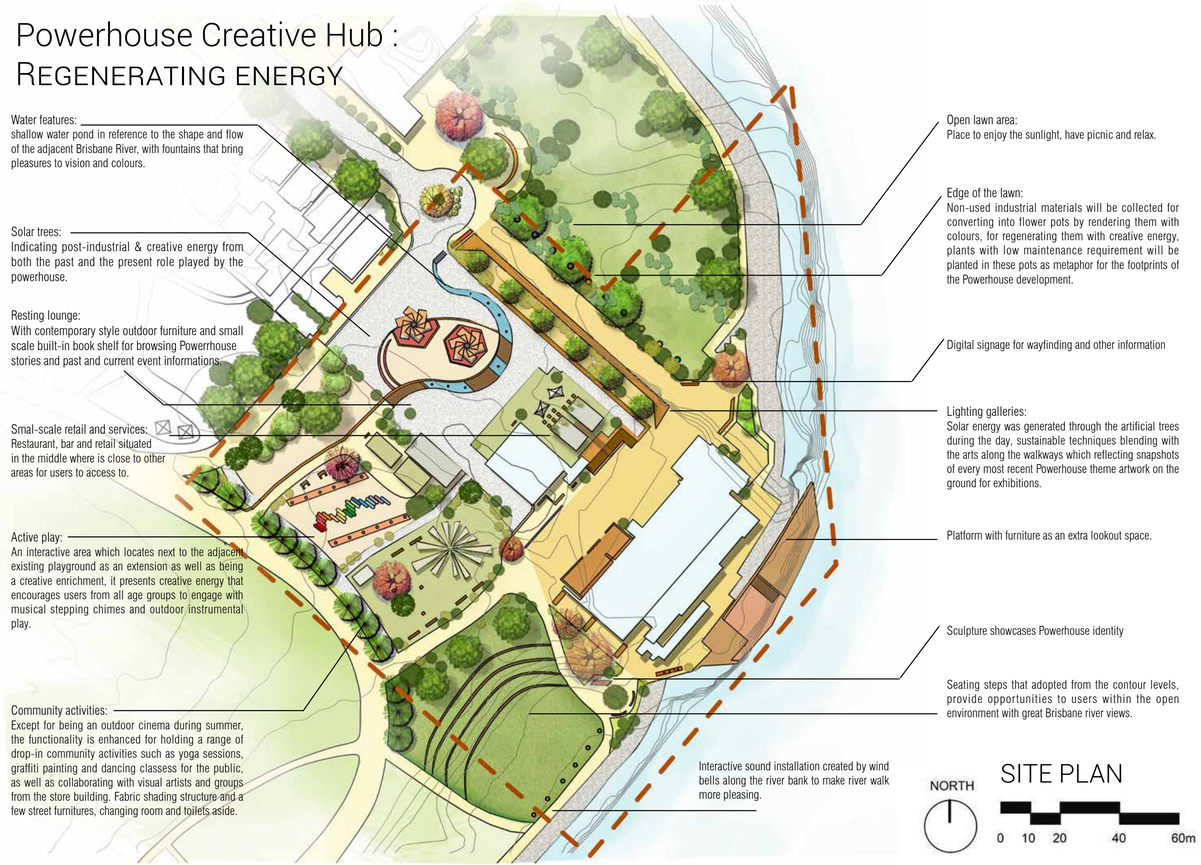
CIRCULATION DIAGRAM

1: Underground and multi-levelled carpark, the ground level being an open space like a contemporary urban plaza showing the Brisbane Powerhouse identity with artificial trees that absorb solar energy during the day and illuminate colourful lights at night, it indicates energy from both the past and the present role played by the powerhouse.
2: Resting lounge with bunches of contemporary style outdoor furnitures.
3: Restaurant, bar and retail situated in the middle where is close to other areas for users to get to.
4: An interactive area as an extension to the adjacent existing playground for creative enrichment, it presents creative energy that encourages users from all age groups to engage with musical stepping chimes and outdoor instrumental play.
5: Community activities space: holding activities such as yoga, dancing, performancing classes etc.
6: Seating steps that adopted from the contour levels, provide opportunities to users within the open environment with great Brisbane river views.
7: Performance lawn with enhanced functionalities
8: Interactive sound installation created by wind bells along the river bank to make river walk more pleasing.
9: Platform with furniture as an extra lookout space.
10: Space for outdoor performance happening in front of the Turbine Building.
11: Lighting galleries and Lighting shows will also illuminate the Turbine Building to indicate and strengthen the contemporary art and culture destination.



DETAILED VIGNETTE 1

Powerhouse Creative Hub : REGENERATING ENERGY



Water features:
shallow water pond in reference to the shape and flow of the adjacent Brisbane River, with fountains that bring pleasures to vision and colours.

Solar trees:
Indicating post-industrial & creative energy from both the past and the present role played by the powerhouse.

Resting lounge:
With contemporary style outdoor furniture and small scale built-in book shelf for browsing Powerrhouse stories and past and current event informations.

Smal-scale retail and services:
Restaurant, bar and retail situated in the middle where is close to other areas for users to access to.

Active play:
An interactive area which locates next to the adjacent existing playground as an extension as well as being a creative enrichment, it presents creative energy that encourages users from all age groups to engage with musical stepping chimes and outdoor instrumental play.

Community activities:
Except for being an outdoor cinema during summer, the functionality is enhanced for holding a range of drop-in community activities such as yoga sessions, graffiti painting and dancing classess for the public, as well as collaborating with visual artists and groups from the store building. Fabric shading structure and a few street furnitures, changing room and toilets aside.

Open lawn area:
Place to enjoy the sunlight, have picnic and relax.

Edge of the lawn:
Non-used industrial materials will be collected for converting into flower pots by rendering them with colours, for regenerating them with creative energy, plants with low maintenance requirement will be planted in these pots as metaphor for the footprints of the Powerhouse development.

Digital signage for wayfinding and other information

Lighting galleries:
Solar energy was generated through the artificial trees during the day, sustainable techniques blending with the arts along the walkways which reflecting snapshots of every most recent Powerhouse theme artwork on the ground for exhibitions.

Platform with furniture as an extra lookout space.

Sculpture showcases Powerhouse identity

Seating steps that adopted from the contour levels, provide opportunities to users within the open environment with great Brisbane river views.

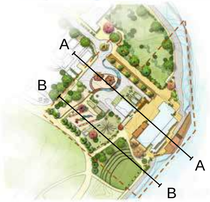
Interactive sound installation created by wind bells along the river bank to make river walk more pleasing.

NORTH

SITE PLAN

0 10 20 40 60m

Powerhouse Creative Hub : REGENERATING ENERGY



Indicating photographs: Pinterest (2017)

The old post-industrial Powerhouse site will become a brand new destination centre with a blend of science and art for contemporary art and creative energy.

Concept of the solar trees

Rooftop space of the retails

Illuminated walkways

Riverside Platform

Accessible litt from the underground carpark

Plaza Water fountains

Seating for outdoor performance space

Lighting will also illuminate the Turbine Building to indicate and strengthen the identity as being a contemporary art and culture destination.

SECTION AA

Powerhouse Creative Hub : REGENERATING ENERGY

Sustainable techniques blending with the arts along the walkways which reflecting snapshots of every lastest Powerhouse theme artwork and events on the ground for exhibitions.

Active water play

Stepping music chimes

Visually pleasing

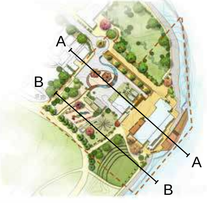
Community activity space

Create shades and dynamic shape

Seating steps based on contours

Lightings along the steps

SECTION BB

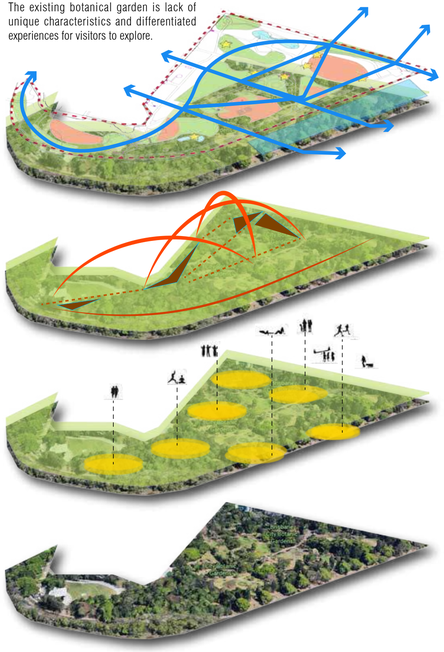


Indicating photographs: Pinterest (2017)

0 10 20 30 40m

4 BRISBANE BOTANIC GARDENS REDESIGN

CONTEXT
The existing botanical garden is lack of unique characteristics and differentiated experiences for visitors to explore.



Keeping...

To meet the expectations of users' need of "place restoration" as well as "healthy community".
To provide opportunities for multi-uses of the open space such as events,
public art exhibitions under different weather conditions.
Improving accessibility that ensure it is easily accessible by all from all directions.

Making...

To ameliorate subtropical and ecological display, keeping the gardens eco-friendly with enjoyable atmosphere.
Inspiring, informing and connecting people with the Australian flora, proving the "sense of place" for visitors.

Education...

To preserve and expand the significant cultural and historical heritage throughout the gardens. Showing historic landmarks and collection in the gardens for education and continue to provide insight into the cultural values.
To explore and learn everyday horticulture and botanic knowledges.

Recreation...

To utilise the existing topographic features for extending opportunities and recreation.
To keep balance between tranquil and vibrant, leafy environment and activity, entertainment, avoid becoming over-commercialised.

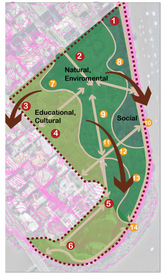
Aesthetics...

To ensure public safety and security throughout the garden as well as night experiences.
To enable a more diverse use of the gardens and showcase the myriad of unique plantings as well as the City Botanic Gardens' unique identity.

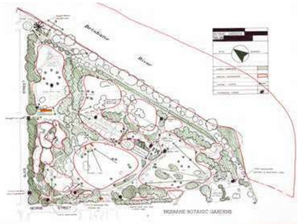
Science & Art...

To offer design elements toward the future, using creative access to information throughout the garden.
To build sustainable water harvesting and reuse system in eco-gardens that showcase environmental and educational values.

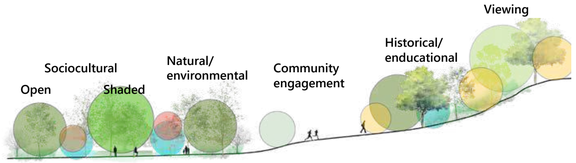
Conceptual design: discovery journey

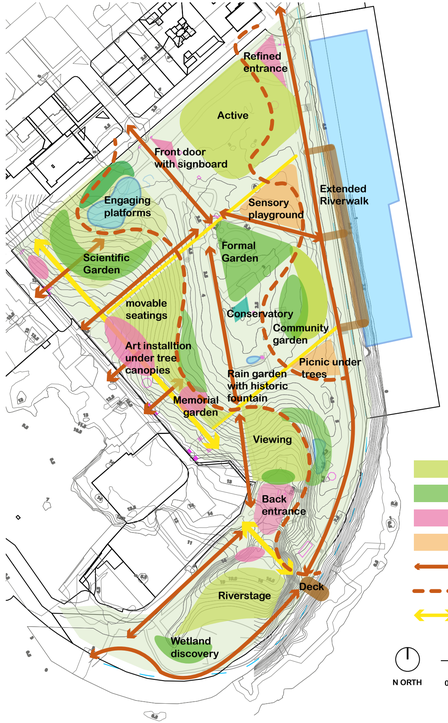


Connected and accessible place:



The concept plan identified two secondary footpaths which modified from the topography, there are a number of functional spaces alongside the journey throughout the walks.



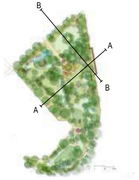


Conceptual Plan

MASTER PLAN

Improvement to the concourse:
Main entry point with a small scale of flower beds on side create the initials of Brisbane City Botanic Garden" for showing the sense of arrival.
New information hub:
Entry points:
Improve sense of arrival from each entrances with inviting signboard of "Brisbane City Botanic Garden" name in art forms.
New resting spots near the river:
Flexible seating on the grass covered slope
Lightings :
Showcase the myriad of unique and interesting plantings throughout the gardens.
Extend the lower lever Riverside walkway and decking
Improvement to circulation:
Floating platforms that allow user across the water.
The existing playground with sensory experiences and botanic features for kids.
Arbour and history walk
Scientific Garden:
Outdoor learning opportunities
Community garden:
Improve the engagement and interaction.
Conservatory with flora display and variety of living plants
Refined entrance:
Art installation along the border of QUT, illuminate at night
Picnic island:
facilities & furnitures for family and friends
Outdoor Arts exhibition space:
With flexible, moveable and contemporary style seatings.
Opportunities for temporary exhibitions or performances
Rain garden:
stormwater harvesting system and self-watering plants.
Memorial Garden:
Board and sculpture display in memorial of history. Seatings and other furnitures under trees.
Rainforest discovery boardwork
Hill side viewing point: Access to all
Back door to The Botanic Garden:
signboard of Botanic Garden and sculpture showing identity
Electronic screens:
As wayfinding devices as well as showing historical and horticultural knowledge and garden infos to the audience
Viewing platform:
Lookout space near the mangrove trees.
0
50
100 m

Additional Space showcases the collections of living plants:
Provide suitable environment for plantings that require low solar exposure,
Offer all weather viewing and opportunities for small scale events such as wedding.
Botanical and horticultural educating for visitors.

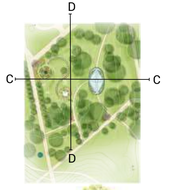


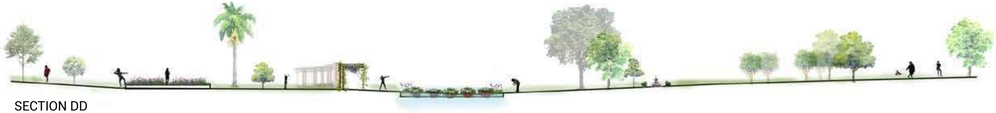
SECTION AA

SECTION BB

A place to learn and create...

Winding arbour with stepping stones on the lawn, showing the timeline of historical and cultural significance from the past through you walk.
The footpath wind through the open area that bring gardens with different themes in connection, and guide visitors where to go.





SECTION DD

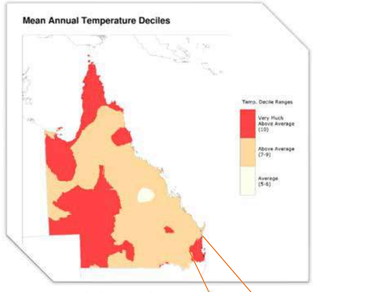
SECTION CC

Reimagine the gardens

Design Statement

The big idea is providing a discovery journey and experiences through the City Botanic Garden, as well as focusing on integrating urban and contemporary lifestyle into the strong subtropical environment and natural green land.
Enhancing its unique environmental, cultural and historical values and qualities throughout the gardens, to celebrate its biodiversity and educate public about various botanic species as well as showcases eco-friendly environment.
To strengthen the City Botanic Garden's identity as an iconic green landmark for the City of Brisbane, a public green realm that is enjoyable by foot, pleasing for visitors to take time to wander and soak in the calm of the magnificent natural environment that offers learning opportunities and recreational experiences toward the future.

Urban Heat Island Effect (UHI) in Brisbane CBD area and surrounding suburbs



Queensland mean annual temperature (Bureau of Meteorology, 2016)

Brisbane Location

Background

As shown in the map, heat areas in LGA sector are slowly expanding and increasing over the past decade from 2004 to 2013. Sprawl development would generate moderate UHI effects, dispersed across the city. (Deilami, Kanruzzaman, & Hayes, 2016)

Even though the changes may not dramatic, visible increasing hot spots around the LGA Sector area are identified on the map.

It is an evident suggesting the increasing existence of urban heat island effect around the LGA Sector area – Brisbane CBD and inner city.

Hot spot area of Brisbane LGA in 2004

Hot spot area of Brisbane LGA in 2013

Increasing temperatures

The research according to Deilami, Kamruzzaman & Hayes (2016) found that the number of suburbs suffering from extreme UHI effect was increasing, from **10%** in 1991 to **20%** in 2013.

This trend will continue if effective planning policies are not introduced.

Thermal Comfort Observation data

At 11:30 pm EST

Brisbane City	Cape Moreton
Temperature	Temperature
28.5°C	26.4°C
At Shade	At Shade
29.6°C	25.9°C
Humidity	Humidity
55%	70%
Wind Spd Km/h	Wind Spd Km/h
11	22

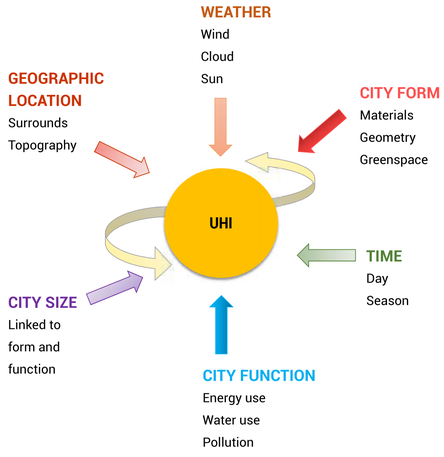
Identifying the problem:

Urban areas in Brisbane is projected to experiences

2.44°-2.54° higher

temperatures compared to rural areas in 2023.

Factors Affecting Urban Heat Islands



Higher temperatures adversely affect our **health**, our **energy consumption**, and our **environment**.

Aim & Objectives

This project aims to create a healthier, cooler and more liveable public environment in the inner city by mitigating the urban heat island effect and improving the resilience of the urban area for adapting future challenges.

1. Minimise the influences of micro-climate generated by human activities
2. Improve the sense of openness and walkability to sustain the city's liveability
3. Increase the level of connected green corridors and open access to green spaces.
4. Regenerate sustainable, green and resilient urban surfaces for adapting climate resilience

Economy prosper in LGA

LGA Sector:
Brisbane City, Fortitude Valley, Newstead-Bowen Hills, Milton, South Brisbane.

$146 billion
in Brisbane

will grow to more
$217 billion
by 2031
as predicted

Growing local economy

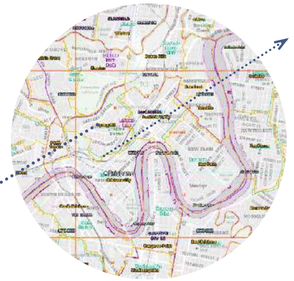
The major potential future growth areas include inner-city and surrounding suburbs, as Brisbane city being an attractive destination for investment and the most important high-value economic cluster in the region. (ShapingSEQ Policy)

Growing employment in city

Additional
290,000 jobs
in Brisbane

will grow to more
443,000 jobs
in metropolitan Brisbane

LGA Sector & Context Appraisals



Land management

Generally, there is limited opportunity for future infill development within the existing development areas.
The Inner City dwellings are characterised by significantly greater density than other areas of Brisbane, which requires more considerations for the local residents' living comfort.

Land use and zones

Significant land use of commercial development, mixed use, residential areas, which ommercial are the dominant part as for the current land use within the LGA Sector.

- *Major centre*
- *Sport & recreation*
- *Mixed use*
- *Community facilities*
- *Mixed industry & business*
- *General industry*

Lanndform and micro-climate

The topography in the LGA sector is mostly flat, with lowest from 10 metres (riversides, CBD, Milton), to the highest around 40-50 metres (Roma St Park, Tenerife park 45m, Montpelier 49m), which allow clean air to travel through wind patterns from surrounding hills and to city's streetscapes.

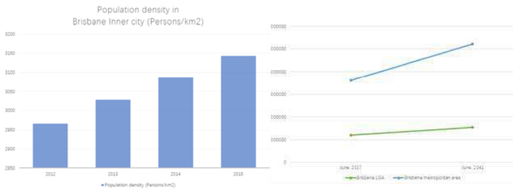
Growing Population

Brisbane LGA
Population in June 2017
1,209,322

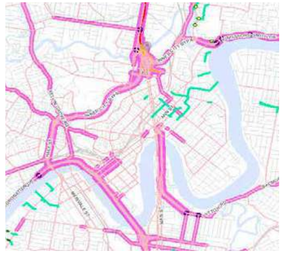
Population projections
in June 2041
1,551,149

metropolitan area
Population in June 2017
2,413,457

Population projections
in June 2041
3,667,302

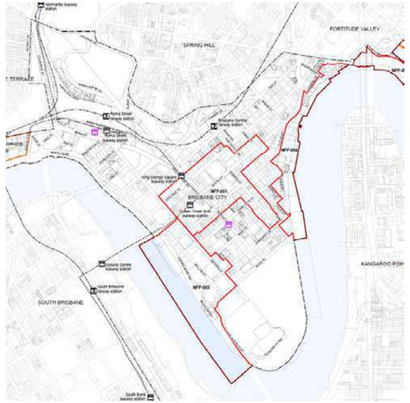


Transport corridors



Transport Air Quality in LGA

Development

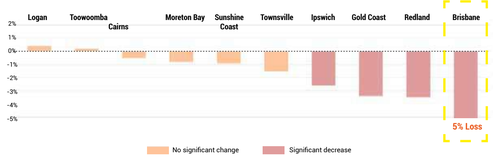


Retail and Business development Priority area

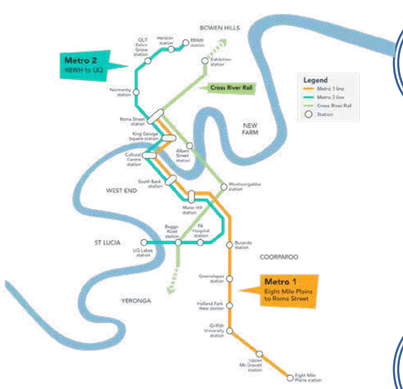
High Energy demand in hot days

Emissions generated within LGA sector are mostly caused by **human activities**, including transport sector greenhouse gas, **road, transport, cars** are the main source of the emission. **Electricity consumption** is also a main source within the Brisbane CBD area.

Green Cover gain & loss in QLD LGAs 2009-2016



Public infrastructure



Public transport use

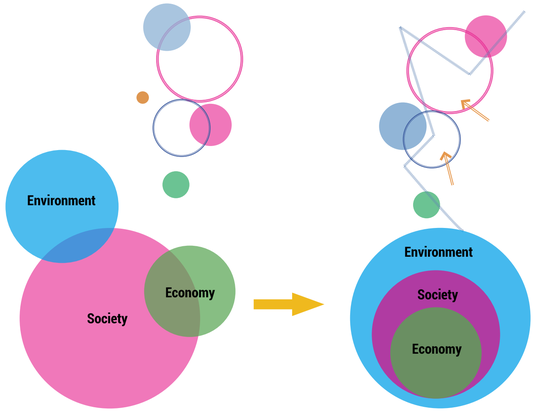
has increasing
1 in 6 people
uses public transport
since 2004

1 in 5 trip
made by
walky and cycling
by 2026

to reduce
13%
Private vehicle use
by 2026

Strategic Plan Vision

Brisbane CBD and inner-city suburbs will become **cooler** and **greener** with **interconnectedness** of Brisbane's open space to sustain the city's **liveability**, pleasant living environment. It will be capable to reduce the impact of urban heat island effects.



Existing

New Theory

Character and identity
Past, present, future

Multi-experiences

System and organism

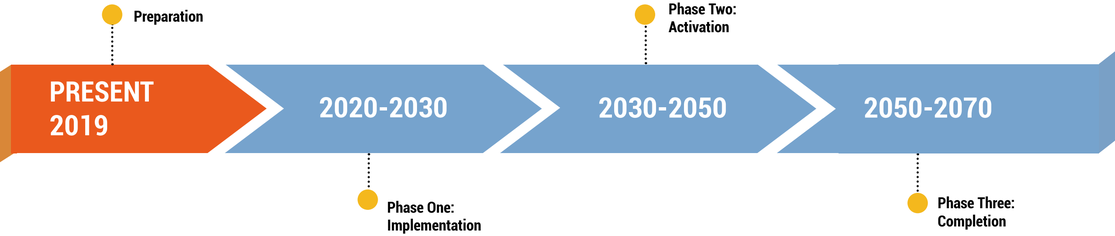
=

Re-generating urban system with green connection

Design statement

The design will take through replacing processes through long term planning to establish a better-functionalised system through green social infrastructures as a part of the urban ecological system,

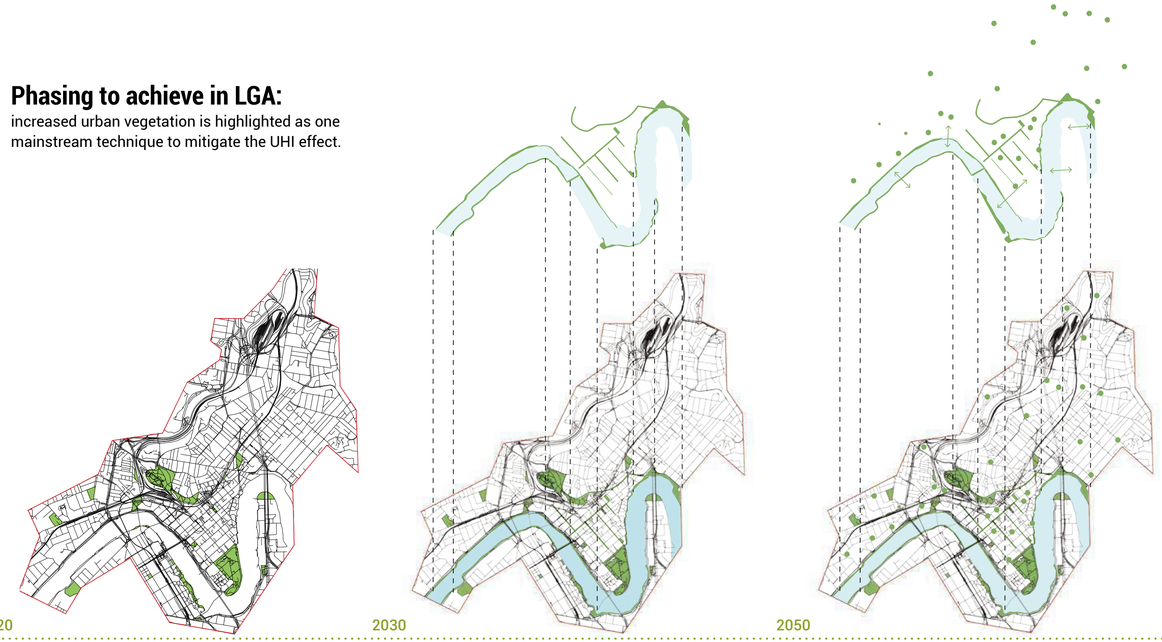
Resolve the impacts of Urban heat island effects by well-connected outdoor green spaces to celebrate subtropical climate and its unique new world city identity, preserve natural systems within the city and build in resilience to the impacts of climate change for the future.



Green Infrastructures

Phasing to achieve in LGA:

increased urban vegetation is highlighted as one mainstream technique to mitigate the UHI effect.



2020 — 2030 — 2050 — 2070

Streetscapes and greenways | Urban green connectivity | Green and subtropical city

Green Infrastructures

Streetscapes and greenways (2020-2030)

Who:
Brisbane City Council;
Environment, Parks and Sustainability Committee;
Healthy Land and Water Organization;
Environment groups

What/How:
Establish a focus on outdoor greenery place making in LGA.

Action:
Offer various access to open space, strengthen the significant landscape character that responds to the urban context in LGA.

Urban green connectivity (2030-2050)

Who:
Brisbane City Council;
Conservation volunteer Australia and other groups

What/How:
Raises funds from regional and national partners for environment volunteer groups, involve community-wide efforts for planting vegetations for selected areas.

Action:
Incorporate with specialists to create Street Tree Master Plan for 2050, set landscape and tree ordinances to help reach the goal of 40% tree canopy cover in LGA by 2050.

Green and subtropical city (2050-2070)

Who:
Brisbane City Council;
The general public, residents in LGA

What/How:
Increasing values and recognization of green and cool city with functional public domain and spaces.

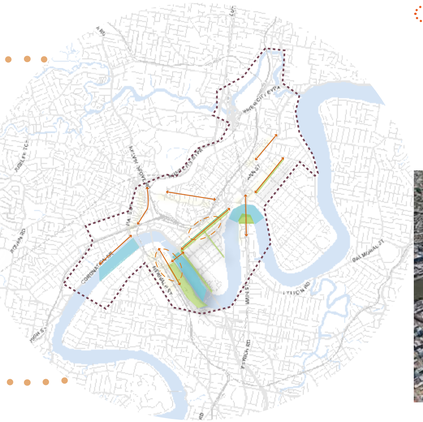
Achieve:
Overall tree canopy will achieve more than 50% of the LGA's landscape system, large featuring trees will be mature and provide maximising shades that meet the expectation of function.

2020 — 2030 — 2050 — 2070

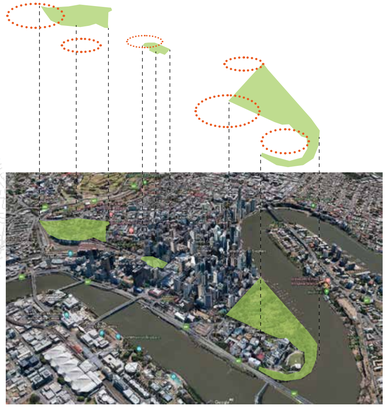
Streetscapes and greenways | Urban green connectivity | Green and subtropical city

Active Community

Potential locations for educational programs



Potential locations for educational programs



Potential locations for educational programs

2020 — 2025 — 2030 — Continue

Public agreement | Educational programs | Place making and continuing education

Active Community

Goals and agreement (2020-2025)

Who/What/How:
Public consultations are integral to and encouraged throughout phase one, including meetings with the Local Advisory committee established to represent broad community goals;

Achieve:
By 2025, overall community will have high to very high level of awareness of UHI effects threats, have the same goal of building cooler liveable designs and how they can be implemented.

Awareness for future generation (2025-2030)

Action:
Run programmed educational activities in different outdoor urban environments for the younger generation.

Achieve:
Deeper understandings of natural systems and climate characteristics, promote the value of urban green spaces and healthy living for the long run.

Place making (2030-continue)

What/How:
Recruiting artists participate in the program to create related inspiring artworks for public message.

Achieve:
Promote energy-sufficient ideas for the future, add highlights points and sense of arrival as well as invite pedestrian to walk across and enjoy those streets more and accomplish short-term phasing values.

2020 — 2025 — 2030- — Continue

Public agreement | Educational programs | Place making and continuing education

Green travel

2020 — 2030 — 2050 — 2070

Encourage green travel options | Traffic congestion control and legislation | Walkable streets and connected city

Green travel

Encourage green travel in LGA (2020-2030)

Who:
Brisbane City Council
Department of transport
State Government

What/How:
Increase the travel efficiency and walkability. set goals for reducing private vehicles during peak times gradually over the phase.

Action:
Raise funds from State Government,
reduce user's budget of public transport costs in LGA.

Achieve:
A solid public foundation on reducing the effects of traffic emissions and congestion in LGA.

Traffic congestion control (2030-2050)

Who:
Brisbane City Council
State Government

What/How:
Identify high volume traffic routes in LGA, connect people with the ongoing Brisbane Metro and cross-river rail to improve the connectivity, offer interchange opportunities between bus, metro, rail that help to further offer less congestion in LGA.

Achieve:
By 2050, there will be widespread sharing, increased transit performance and strengthen infrastructure for walking and cycling, to allow maximum energy efficiency.

Walkable and connected city (2050-2070)

Who:
Brisbane City Council
Department of transport

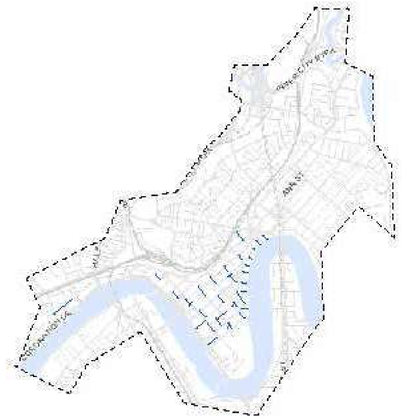
What/How:
Incorporates best-practice built form and landscape design elements to maximise wind movement around buildings and the dispersion of road-traffic air pollutants.

Achieve:
Cultivate and potentially change travel habit within LGA sector by increasing the number of accessible green walkways and well-maintained public transport offered by greener Brisbane inner-city.

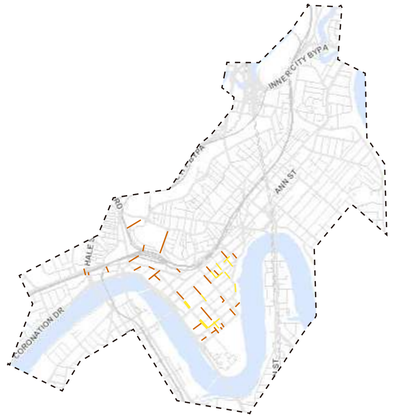
2020 — 2030 — 2050 — 2070

Encourage green travel options | Traffic congestion control and legislation | Walkable streets and connected city

Urban surface

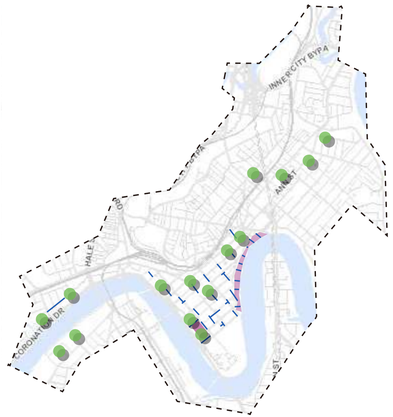


Cool surface materials for roads



Additional solar panels in streetscape

Reconstruction for heat-preventing materials



Cool surface materials for roads

Major Riverside Precincts

Potential Rooftop green spaces

2020 — 2030 — 2050 — 2070

Surfaces and materials | Sustainable layers for energy saving | Urban landscape layers upgrade

Urban surface

Surfaces and materials (2020-2030)

What/How:
Introducing policies for future development that will be required to apply permeable layers and surfaces.

Action:
Reconstructing appropriate paving materials for major road corridors and pedestrian-scale streetscapes where currently constructed with hard concrete or non-permeable surfaces in LGA.

Sustainable and energy saving (2025-2050)

What/How:
Support and encourage business owners to apply heat preventing materials and place solar panels on rooftops where if possible.

Action:
Future Development will be required to improve the landscaped outdoor spaces equivalent to a minimum of 80% of the site which will upgrade the current standards of 70% in the planning scheme policies.

Urban landscape layers upgrade (2040-2070)

What/How:
Permeable layers may give urban trees the rooting space that they need to grow to full size.

Action:
Maintain the existing landscape planters and rooting space that integrating water-smart strategies for vegetated treatment.

Achieve:
Ensure Brisbane is a leading green city in energy efficiency and having increased overall soft surfaces.

2020 — 2030 — 2050 — 2070

Surfaces and materials | Sustainable layers for energy saving | Urban landscape layers upgrade

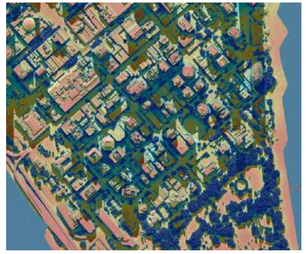
Brisbane CBD from Nearmap (2019)

Image depicting potential development possibilities for Brisbane CBD

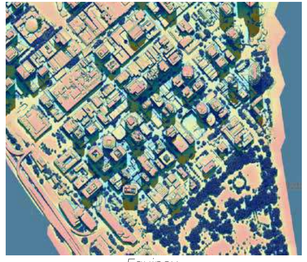
Area of control: Site Design

Building materials are major contributors to the development of heat islands where heat is stored in the thermal mass of the built environment.
0 50 100 150m

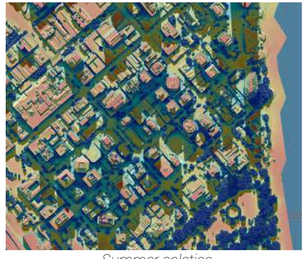
Solar and wind Analysis



Winter solstice



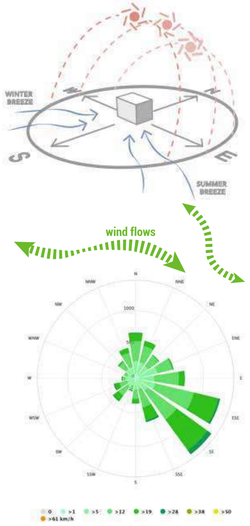
Equinox



Summer solstice

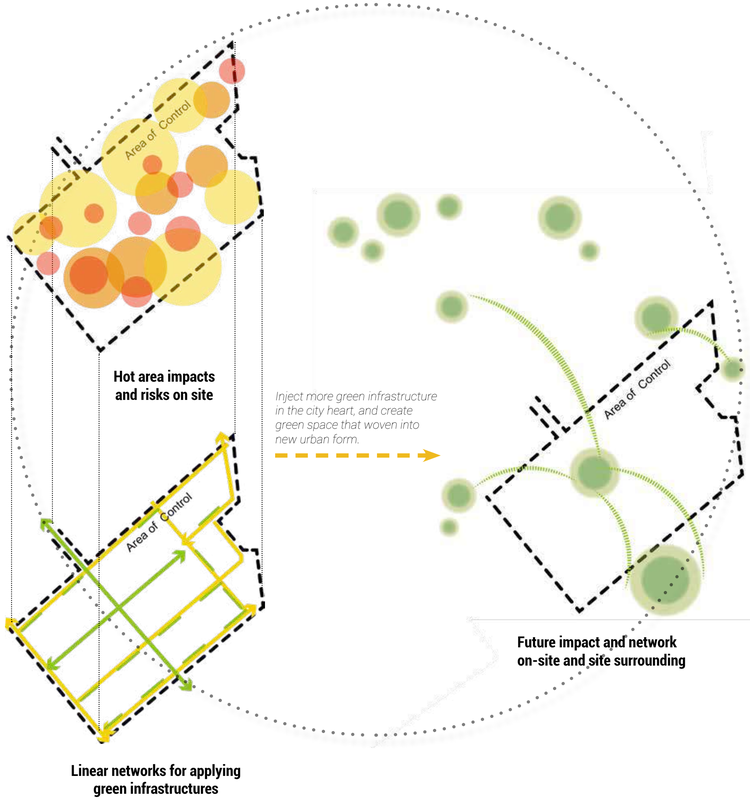
Solar pattern: movement of sun

Mothly solar pattern mapping at 12:30 pm



Wind speed and direction rose

Ideogram

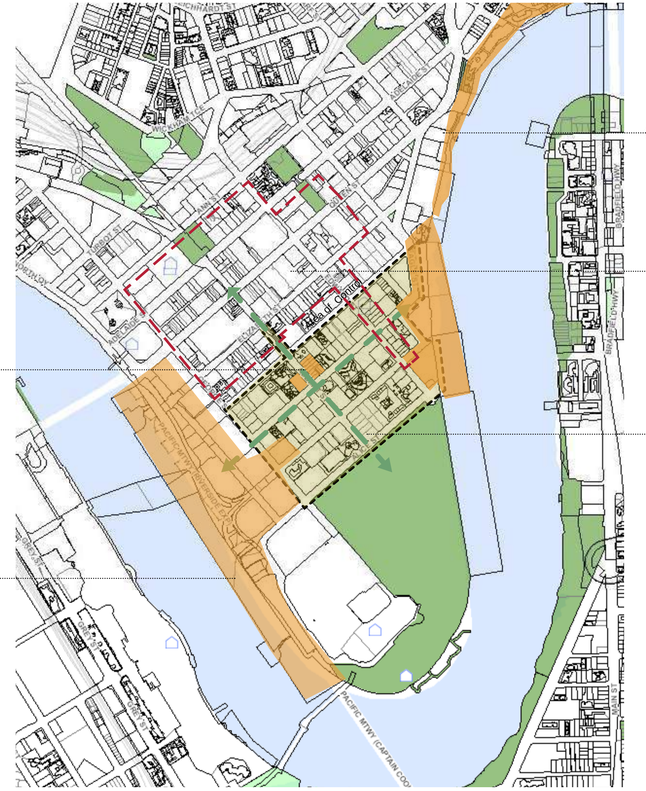

Area of Control
Hot area impacts and risks on site
Area of Control
Linear networks for applying green infrastructures
Inject more green infrastructure in the city heart, and create green space that woven into new urban form.
Area of Control
Future impact and network on-site and site surrounding

Site Design: Area of Control, influence & effect

Albert Street Cross River Rail Priority Development Area

Development for Queens Wharf

The on-site and immediate surrounding contexts and systems will support the realisation and delivery of the proposed site design and will serve as catalysts for further changes which in accordance with the Brisbane City Council Vision and City Centre Master Plan.



Riverside precincts

Retail and Business

'Green Spine' Vision

Idea of Albert Street PICNIC event, 2013.

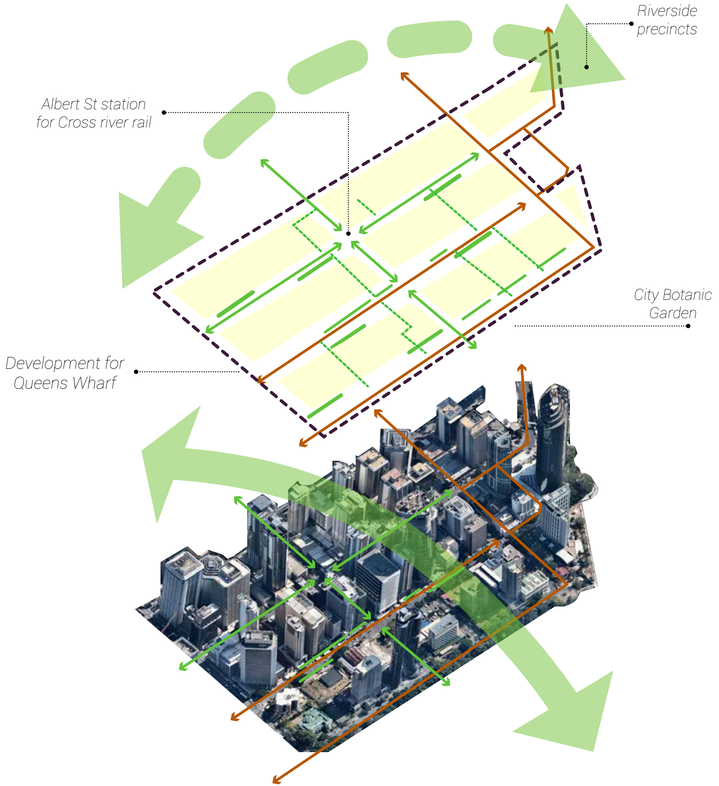
CO_2 emissions decrease

Cooler average temperatures

Streets liveability increase

Green travel on site

As the number of vehicles on the roads also influences heat generating in urban environment.
Therefore, reducing private vehicles access to the streets will be one approach of the project for giving back opportunities to people to be active on the streets, and having more spaces of greens for people.



Area of Influence

The on-site and immediate surrounding contexts and systems will support the realisation and delivery of the proposed site design and will serve as catalysts for further changes which in accordance with the Brisbane City Council Vision and City Centre Master Plan.

Street features

Heritage:
Margaret & Mary Steet History and heritage listings

Contemporary:
Commercial character buildings, Apartment buildings

Green connections:
Community purpose green networks

Major intersections

Riverside Expressway
William Street
George Street
Albert Street
Edward Street
Felix Street

Area of Effect

The probable effects of the designed changes will have various benefits including:

Subtropical

Expansive, shaded terraces and walkways with lush, subtropical plantings

Access and openness

Improved accessible green laneways and links that connect the site

Activation

Continuous public green space along streets' sections designed for people that enhance residents, workers and visitor experiences

Traffic-free zones & Pedestrian friendly streets

Widened and upgraded walkways for safer, cooler walking experiences

Socio-economic

Increasing more dining, retail and market opportunities, active new business potentialson site.

Public infrastructure

Ongoing development for public infrastructures and site design will be supplementary to each other.

Disconnect

Increase social interaction and inclusion

Safer and more accessible streets

Increase attractiveness of local streets

Cleaner air

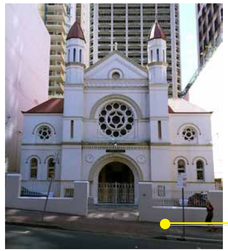
Reduce congestion

Improve micro climate

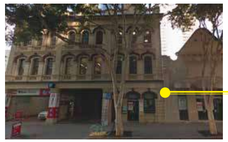
Connecting

Carbon and energy saving

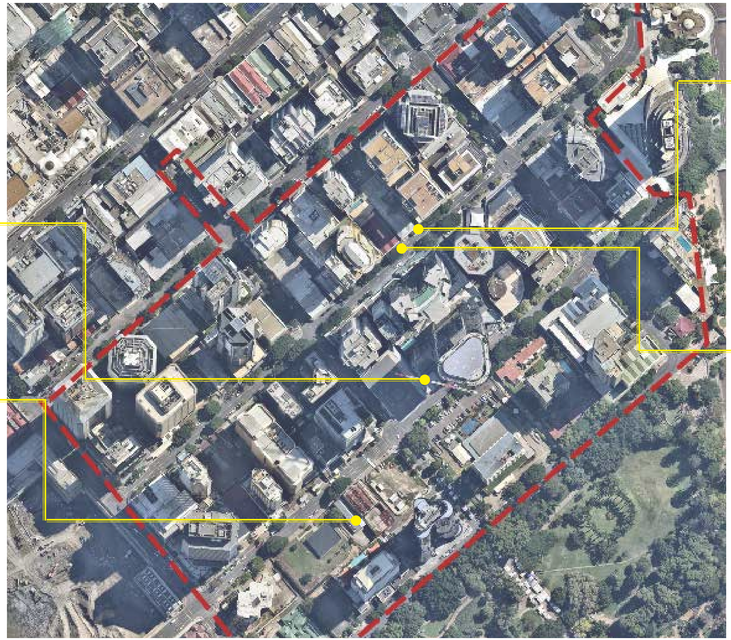
Reduce cooling costs



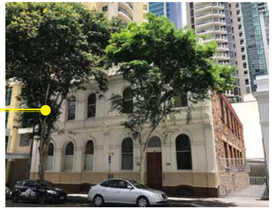
98 Margaret Street:
Brisbane Synagogue



125 &129 Margaret Street:
Acme Engineering Works,
(also known as HB Sales Building),
and Watson Brothers Building



138 Mary Street:
A wine and spirits storehouse built in about 1901 for Perkins Brewery (now Castlemaine Perkins)



Mooneys Building at 130 Mary Street:
A warehouse built in 1883 for William Mooney, a Brisbane wholesale and retail tobacconist

Disconnect

Probable effects of designed changes will bring enjoyable landscape features and function zones and activate the street uses which will also strengthen the sense of the role and existence of those heritage buildings on site.

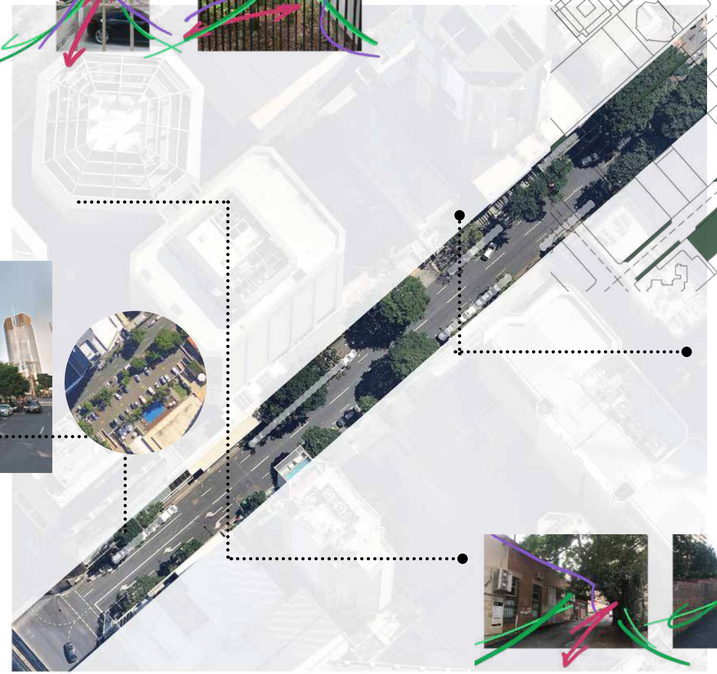
Connecting

Phased Site Design: Phase One

Streetscapes and greenways Upgrade (2020-2030)

Open access

Car Park removal



Laneways are designed "to give something back to the people of Brisbane" by offering consistently accessible laneway spaces and neighbourly contribution to greener the city.

Greener streets in the city

A city with well-planned and well-managed green infrastructure becomes more resilient, sustainable. Help to cool the air temperatures from 2˚C by up to 8˚C.

Greener, safer and more accessible streets

Cleaner air

Increase connectivity of green laneways

Increase social interaction and inclusion

Reduce congestion

Reduce cooling costs

Carbon and energy saving

Improve micro-climate

2020 2030 2050 2070

Green Infrastructures

Streetscapes and greenways

Urban green connectivity

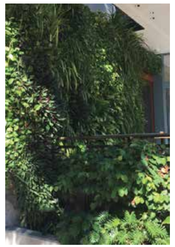
Green and shady subtropical city

Subtropical Plantings

Subtropical botanical colours

Vertical Greens

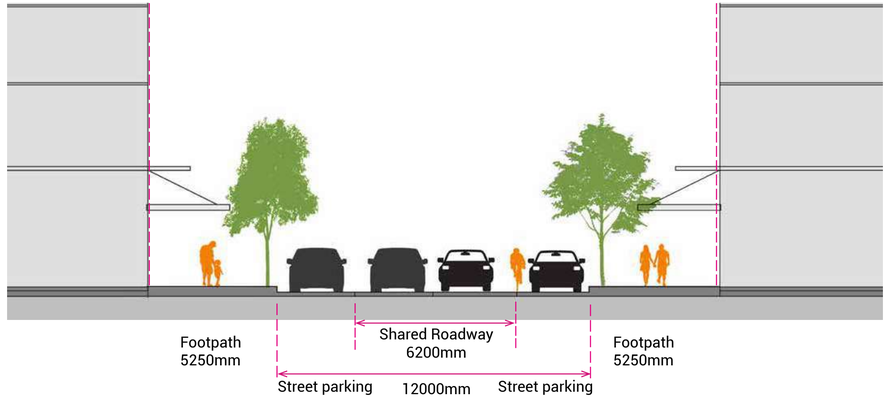
Green edges



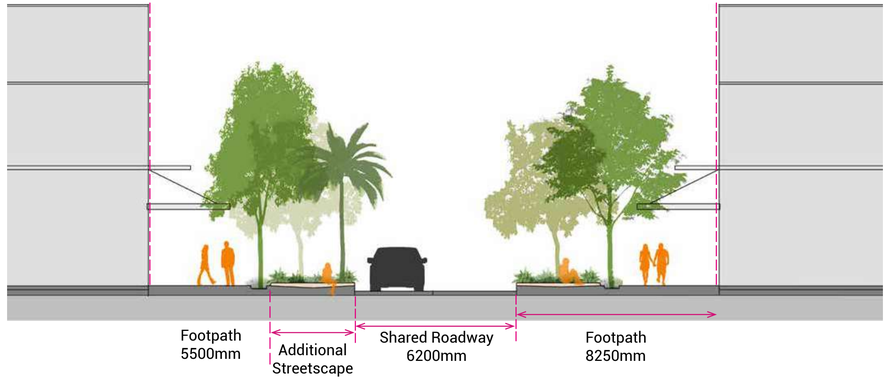
Tall Landmark subtropical trees

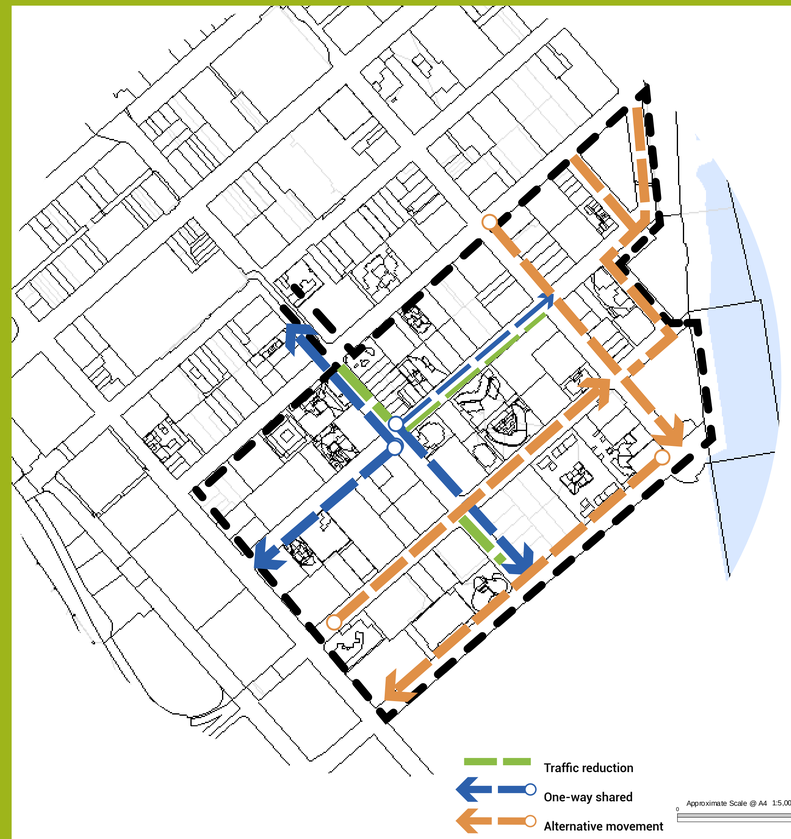
The present street tree canopy coverage of 28.2% road reserve cover should be targeted to be increased to 75% cover within 10 years post construction

Existing street



Proposing street 1





Phased Site Design: Phase One

Streetscapes and greenways Upgrade (2020-2030)

1. Inform the public of the greener city heart framework before implementation.
2. Traffic volume control and reduction on Albert Street, in accordance with the delivery of the Albert st green spine project.
3. Transform one section of Mary Street to become a one-way shared road for testing and limiting vehicular traffic on the section.

Phased Site Design: Phase One

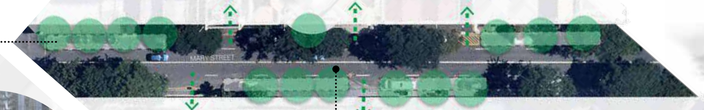
Streetscapes and greenways Upgrade (2020-2030)

3. Apply peak hours congestion charges to major busy roads on site for cultivating people's green travel habits to the site.
4. Charges will be used for investment to the proposed green walkable streets.

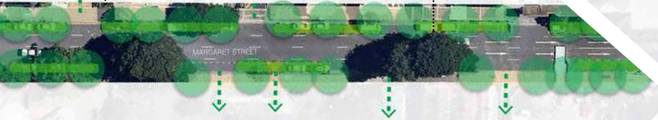
Phase two: Urban green connectivity

Existing trees retained

Trees shading the west and south-west of buildings reduce summertime energy demand for cooling by blocking the hot afternoon sun.



Car parking areas transformed to amenable green space on streets.



Reconstructing appropriate paving materials for pedestrianised streets sections.

Shading space:

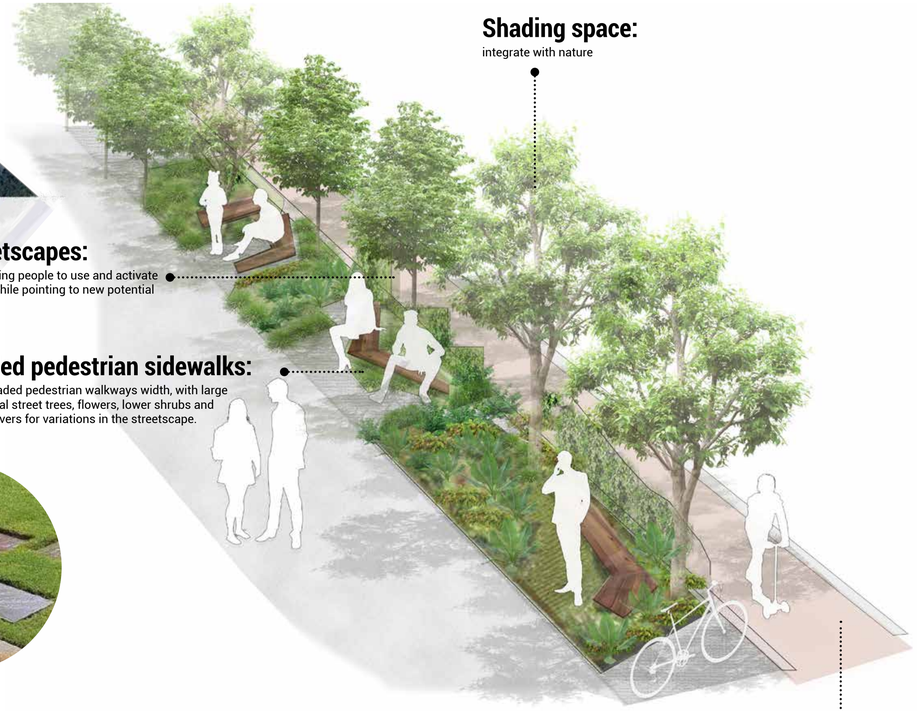
integrate with nature

Streetscapes:

Empowering people to use and activate the site while pointing to new potential

Shaded pedestrian sidewalks:

widen shaded pedestrian walkways width, with large subtropical street trees, flowers, lower shrubs and groundcovers for variations in the streetscape.



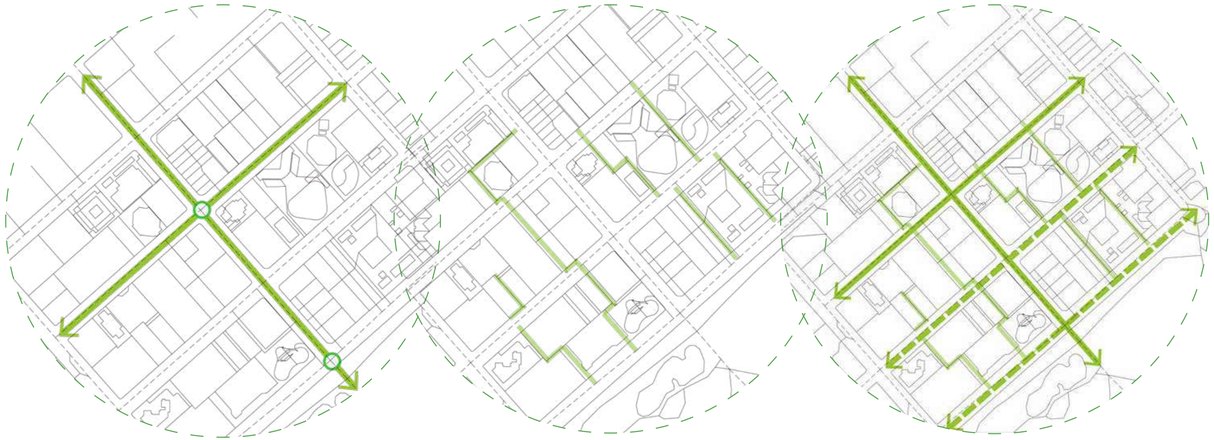
Bikeways

Safer movement

Proposing street 2

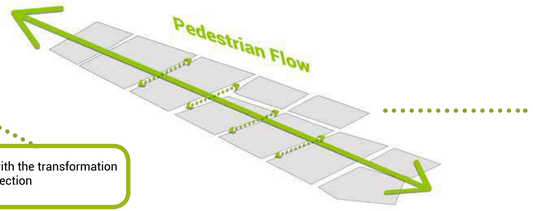
Proposing street 3

Phase two: Urban green connectivity



1) Increasing the level of investment for laneways access with green display, allow gaps for airflows between buildings.

2) Implement further change with the transformation of Albert street & Mary street section



3) Create green networks on traffic-free sections of Mary St that provide large feature tree and seating, with shades/shelters

4) Set requirement for applying an increasing amount of solar collectors on building roofs where appropriate.

Additional green public meeting space in the centre of two streets intersection

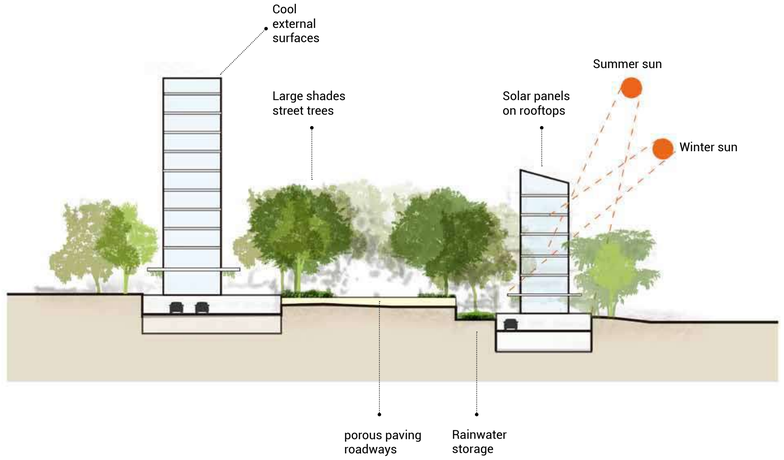
Enhancing the green city heart identity and reputation of the green networks, continue to influence and spread to the surrounding site.

Phase three: Green and subtropical city

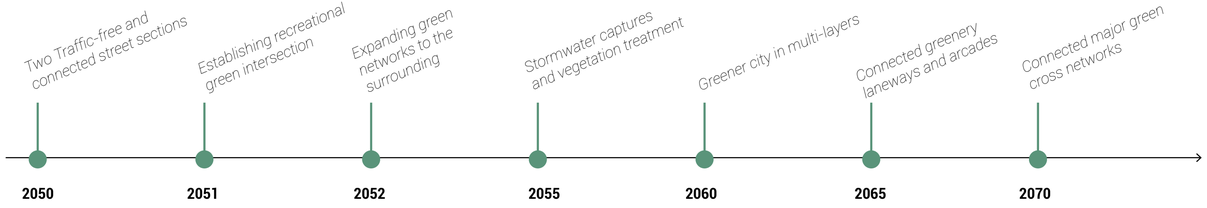
As the delivery of the fundamental works of the past two phases, the project is going to strengthen the identity of green streets and impact the rest of the adjacent urban environment.

Actively encourage 'green' walls and 'green' rooftops throughout the subtropical city.

Large shade trees flourish in spaces between buildings
Laneways form the edges of green areas
Shady trees and pergolas promote cool pathways for breezes entering buildings.
Overlapping canopies to provide continuous shade cover on tree-lined streets.



Be greener and cooler

A city with well-planned and well-managed green infrastructure becomes more resilient, sustainable. Help to cool the air temperatures from 2˚C by up to 8˚C.

Trees around buildings can reduce the need for air conditioning by 30%, reducing air conditioner use and carbon emissions by an estimated 12-15% per annum.